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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. 1 JANUARY, 1929. PART 1.

## Event and Comment.

### It was a Good Year.

TAKEN all round the year just ended was a good one for Queensland agriculture. Most farming districts continued to make steady progress. On all sides are signs of healthy expansion which followed generous and well-distributed rains over most of the closely settled areas. A wider appreciation of modern methods of husbandry is becoming general. There are evidences, for instance, that the Queensland dairyman is no longer content to tolerate star boarders in his herd, and the same spirit is becoming characteristic of every branch of rural industry. In this healthy progress the Department of Agriculture and Stock has been no small influence. Every encouragement is given by it to the strengthening of the bond of interest and sympathy between farmer and official. The Department prides itself on its accessibility and service to all engaged in the work of the country and, as a consequence, is accepted by farmers as a wise guide and a firm friend in difficulty. In all our rural enterprises there is a growing disposition to take the broad and long view of our problems and co-operate whole-heartedly with the Department in its efforts towards agricultural stability. The last Annual Report of the work of the Department by the Under Secretary (Mr. Graham) and its appendices, show unmistakeably that the heads of departmental divisions and their staffs are closely informed with all that is happening to all forms of husbandry in the field, on the run, and in the factory, and there is a certainty about their reports that stamps them as men who know their job and are very keen on it.

In the course of a notable address to a ward conference of members of the Lockyer Local Producers' Associations, and which is presented at length in this issue, the Minister for Agriculture and Stock (Mr. W. Forgan Smith) described the wide range of interests and duties covered by officers of the Department and the

immense value of their services to the farming industry, and consequently to the State. In that fine address the Minister showed how closely inter-related are the activities of the Department and the work of the man on the land, right from the turning of the furrow to the selling of the product.

Though much has been done in the extension of this service there is much more to do, and in the coming year the Department looks naturally to the farmer for hearty and practical co-operation in the effort to place and keep Queensland among the foremost agricultural countries of the world. As the Minister has pointed out, Queensland, a pioneer in land settlement, has quite fittingly become a pioneer in agricultural organisation, and this phase of her enterprise is continuing to attract inquiries from other countries seeking information as to the form of agricultural organisation and marketing control initiated by the Queensland Government for the benefit of the Queensland farmer. Only the other day further requests for information were received from noted economists in California, and these serve to indicate the extent of the world interest in Queensland's efforts to scientifically organise its rural industries, and may be regarded as some slight recognition of our claim as a pioneer in the field of social and economic reform.

## Work.

IT was Elbert Hubbard who said that once men thought work was a curse; then it came to them that it was a necessary evil; and yesterday the truth dawned upon them that it is a blessed privilege. In his impressive seasonal message to the citizens of Queensland the Minister, Mr. Forgan Smith, as Deputy Premier of the State, possibly had something like that in mind when he pointed out the nobility of the simple task and the wisdom of our starting the New Year well by performing satisfactorily the duty that lies closest at hand. After all no really healthy-minded man could endure a life of idleness or futility, least of all Australians with a continent to conquer and only the spade work yet done. To labour is to pray, as the old philosopher had it, and the dignity of worth is really built on how we do our day's work. Time and the angels are on the side of the man or the people who do the work of the world; and humanity, healthy humanity, has no time for parasites. The world used to be divided into two classes, masters and slaves. Later on they became gentlemen and workers. The designation was altered, but the relationship remained practically the same. To-day, the vast majority of us are workers and glad to be workers believing in ourselves, appreciating the dignity of the common or necessary task and its successful performance as a lift along the road to better things, both for ourselves and posterity.

## The Economics of Dairying.

OVER in New Zealand, an investigation, similar to that entered into recently in Queensland, has been made into the economics of the dairying industry and with very much the same results. For the purposes of the inquiry it was considered, broadly speaking, that rural economics may be divided into two sections—management and marketing. The whole of the attention of the official investigators, in this instance, was devoted to the side of farm management. It was held that the analysis of management factors would be very useful to both present and prospective settlers; and that the systematic collection and study of facts relative to a large number of farms would provide a fund of information of great assistance to the farmer, and which would, ordinarily, be beyond his reach. Accordingly a complete survey of conditions as to production and costs was made on two hundred dairy farms. The first object was to determine what was the most important factor in dairying, and that of production per acre or per cow was the conclusion reached. That is precisely what our own Departmental Economic Committee decided after a close study of the position and conditions of the industry in Queensland. Interests, rates, maintenance, and general charges must all come out of the land and, as far as possible, every acre should return its fair proportion of the expenses of the whole enterprise. Summarised, the general conclusions arrived at by the New Zealand investigators were the necessity of aiming at higher production per acre, and raising herd production averages, which, in the long run, amounts to very much the same thing. Other points brought out were that proper feeding of the herd

is of greater moment than breeding high producers, but to us there is no apparent reason why these should not go together; and that where there is sufficient feed for all the animals, it is unsound to cull unless the discarded cow can be replaced by a higher producer. The advantage of top-dressing of pastures was also made clear to the investigators. Maintenance expenses over all the farms worked out at about £5 per cow, and this they accepted as a sound general figure. On the same basis of inquiry it would be interesting to find out just how much the Queensland cow has to produce before her owner can collect a profit.

## A Queenslander Abroad.

LIKE most Australians who go abroad, Mr. W. T. Harris, the Secretary of the Co-operative Dairy Association, who last year enjoyed a well-earned holiday on a world tour, has come back a better Australian. He had the good fortune of being able to visit many of the older dairying countries, including Canada, Great Britain, the Irish Free State, and Denmark, and what he saw intensified his enthusiasm for the Australian system of co-operation. Everywhere he went he found an interest in Queensland's rural legislation, and he was never tired of quoting it as evidence of our progressiveness. There were systems, methods, and ideas, too, which he found worthy of our adoption, and other points in dairy practice worthy of our emulation. Let Mr. Harris tell portion of his story in his own words:—

"I'm satisfied Queensland can hold her own against the world so far as the dairying industry is concerned. I believe we should use every endeavour to increase production and quality, but it is satisfactory to know the co-operative associations in this State have done well.

"I travelled through England, Scotland, and Ireland. The growth of the industry in Ireland is remarkable. The value of her exports to England last year was £4,000,000 and she will be a serious competitor with Denmark for that trade. The quality of the Irish product has improved out of all knowledge.

"In Denmark I found that the factories were not better equipped than our own factories. The best butter is exported to London, and yet the average Dane eats margarine instead of butter because of its relative cheapness. Denmark is a remarkable little country, and there herd testing is carried on methodically. Denmark is producing more butter than ever and in 1926 her production was 4,200,000 tons of milk, yet dairymen there did not appear to be very prosperous as we in Queensland understand prosperity. They have to spend all their money in foodstuffs and fertilisers and have to scratch for a living from daylight to dark. The butter not exported is consumed in the country, but it is an extraordinary fact that the Danes consume four times as much margarine as butter.

"In the Fraser Valley in Canada I found herd testing carried out on an excellent system and the conviction was forced on me that the factory managers in Queensland must encourage herd testing in every possible way. No country in the world, however, can hold its own against Australia so far as climatic conditions for dairying are concerned.

"In London I found it was a moot point whether Australian butter was consumed as "Australian" butter. There is a good reason for this probable loss of identity and that is—lack of a continuity of supply. English distributors handle blended butters. The English people cannot afford to use butter as generously as we do. They want a butter that will spread readily and thinly. Australians eat the best butters and are not used to skimping themselves either, but other peoples are not so favoured in this respect as we are. Whisky, coffee, and cigarettes are blended, and I cannot see any reason why butter should not be blended. Retailers have to supply what consumers want.

"Australia's great butter difficulty in London is lack of regular supplies and every effort must be made to remedy that state of affairs. I was not impressed with the advertising campaigns conducted in Great Britain on behalf of Australian butter. F.O.B. sales do, in my opinion, a great deal of harm. With such a method of selling, market prices are not maintained at proper levels and I would advise factories against selling butter f.o.b. I am glad to be home again and am anxious to do what I can to assist in maintaining Queensland's proud position in the dairying industry."

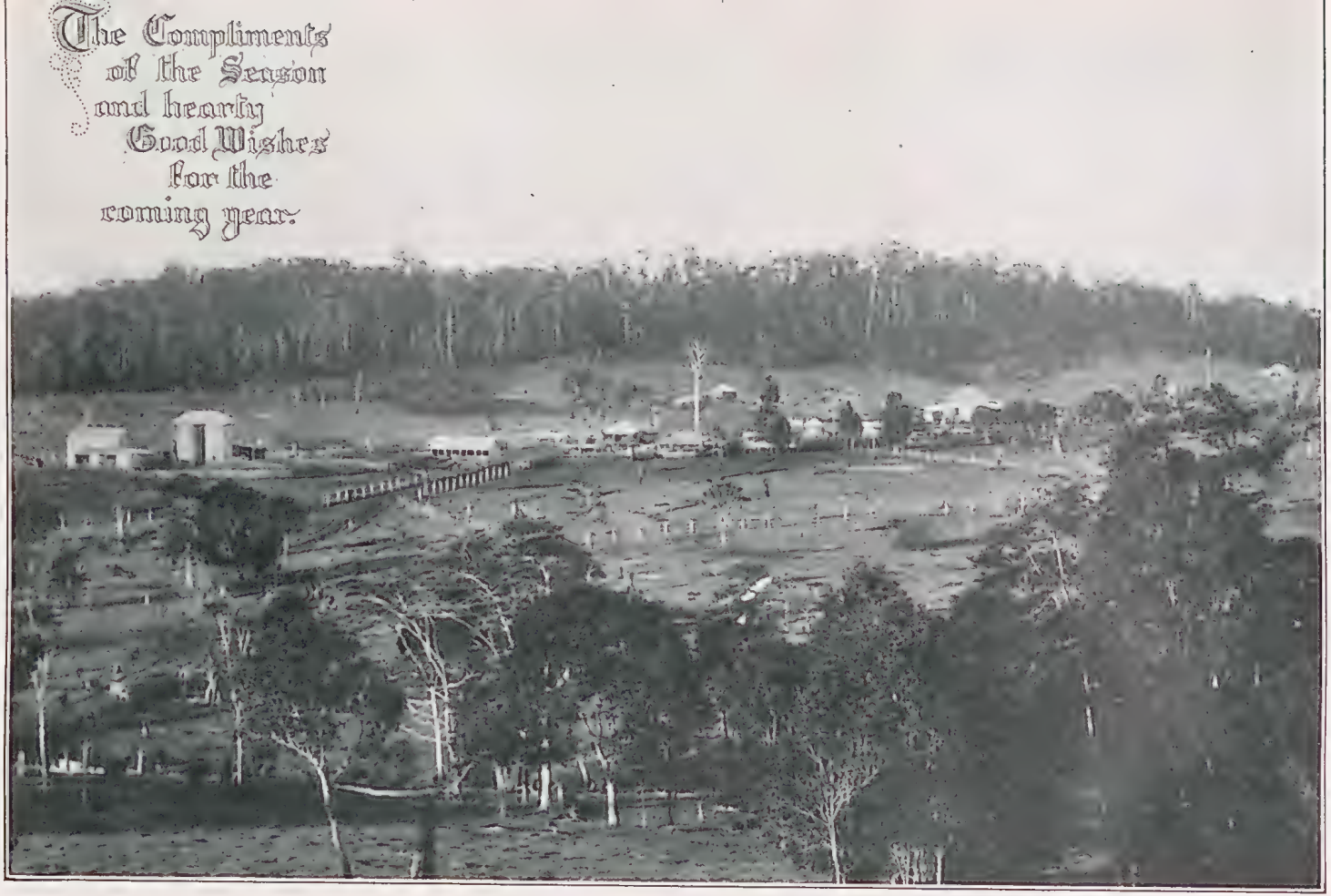


PLATE 1.

A Scene on the Atherton Tableland, North Queensland. One of the richest potential agricultural *regions in the world.* A *modern* dairy farm, walled in by tropical jungle.

# The Minister's New Year Message

## To the Citizens of Queensland.

*The Deputy Premier and Minister of Agriculture and Stock, Hon. W. Forgan Smith, included in his seasonal greetings to the citizens of Queensland the following impressive message :—*

"Our duty as citizens of the Commonwealth, as contributors to the work of our generation, is to take our share of the difficulties and the dangers of common enterprise, as well as its rewards and profits.

"The coming year and the future generally will make demands on our courage, resolution and goodwill, and our skill in constructive citizenship. It is an accepted axiom that civilisation makes progress only so long as the courage of man responds to the human needs of each generation, and so we should not allow ourselves to visualise our destiny as a permanent soft job. The task of humanity is a hard one, destined to become harder with the passing of the years, and we must guard against any weakening of our national character, lest we endanger our inheritance from the pioneers.

"The road to achievement lies through work and the capacity to endure, and our progress demands a clear perception of the dangers and the difficulties that beset our times, together with a realisation of the value of the common task, backed by a resolve to get our job done and done well.

"Citizenship is a responsibility as well as a right, and we should regard it as a privilege to serve the State in any capacity. Service is the greatest test of character, and determines the greatness or otherwise of a nation as well as individuals.

"There is no better country in the world than Australia, and if we are brave enough and good enough we can make it a better place still. Let our resolve, therefore, be to always work with this objective in view, and we can commence with the duty that lies nearest to us."

W. Forgan Smith

Deputy Premier.

PLATE 2.—GROUP OF DELEGATES AND FARMERS WHO ATTENDED THE LOCKYER WARD CONFERENCE OF LOCAL PRODUCERS' ASSOCIATIONS AT GATTON COLLEGE ON 27TH NOVEMBER, 1928.

The Deputy-Premier and Minister for Agriculture, Mr. W. Forgan Smith, M.L.A., is fifth from the left in the front row; Mr. George Logan, M.L.A. (*Member for the District*), is on the Minister's right, with Professor Murray and Mr. W. A. Fielding (*Chairman of the Conference*) on the Minister's left.

# AGRICULTURE IN QUEENSLAND.

## SYSTEMATIC ORGANISATION OF RURAL INDUSTRY.

### MINISTER'S COMPREHENSIVE REVIEW.

WHAT THE DEPARTMENT OF AGRICULTURE AND STOCK IS DOING—STATE FARMS—GRAIN PROPAGATION AND IMPROVEMENT—SCIENCE AND FARMING—POOLS IN OPERATION—SUGAR GROWING AND DAIRYING—FARMER'S WOOL SCHEME—PIG AND POULTRY RAISING—DEPARTMENTAL ORGANISATION.

**"We have provided all necessary legislative machinery to assist in the extension of agriculture, with a view to improving the conditions of those engaged in primary production.**

**"Co-operative activity is the most significant social and economic factor in the life of the community to-day, and, according to the manner in which it is developed and controlled, so will the future of the various industries be determined.**

**"I look to the farmers and those interested in agriculture generally to be loyal to their own organisations; to help so far as in their power to place them on a better and more stable footing; to elect leaders distinguished for their honesty of purpose, vision, and capacity; and to co-operate also in all the efforts that are being made by my Department to improve the standards of production and efficiency generally in industry."**—*Hon. W. Forgan Smith.*

AT a Ward Conference of the Local Producers' Associations of the Lockyer District, held at the Queensland Agricultural High School and College at Gatton on Tuesday, 27th November, the Deputy Premier and Minister for Agriculture and Stock, Hon. W. Forgan Smith, delivered a notable address, in the course of which he reviewed the organisation and activities of his Department and its influence on rural industry in Queensland.

Mr. W. Forgan Smith was present at the invitation of the Executive of the Laidley and Grantham Wards of the Local Producers' Associations. Mr. W. A. Fielding, of the Laidley Ward, occupied the chair, and in welcoming the Minister to the Conference said that "personally he had come in contact with the Minister of Agriculture before he had come to the Lockyer district, and putting party politics aside, he could say that in Mr. Forgan Smith the man on the land had a most sympathetic Minister—a practical man, out to assist the farmers. He could also state that if any body of farmers put up any practical scheme or request to the Minister he would do his best to see that the request be granted. There was no splitting of straws with the Minister, who was straight out. The Minister's interests were those of the farmers in trying to bring about better conditions for them." (Applause.)

Following is the text of the Minister's remarks:—

In the immediate post-war period, agriculture, not only in Queensland and Australia but throughout the world, was faced with perplexing and unprecedented difficulties. So far as legislation could be applied to both cause and effect, it was applied in Queensland in a series of enactments that have aroused the interest and often inspired the emulation of authorities in other States and other countries. Queensland, a pioneer in industry and settlement and social improvement, became again a pioneer in agricultural legislation.

### Systematic Rural Organisation in Queensland.

As a result of these activities, cotton growing, practically non-existent, was raised to a promising industry. Systematic organisation of rural industry along co-operative lines was initiated. The Council of Agriculture, together with subsidiary

organisations under farmer control, were established. The system of pooling of primary products was widely extended, and a fruit marketing system organised. The co-operative movement was strengthened; banana-growing was brought under strict white labour conditions, making it an entirely white man's industry. The stabilisation of the meat and dairying industries was advanced long stages nearer accomplishment. The Commonwealth Sugar Agreement was renewed. Sugar Cane Prices legislation was adjusted to make its operation more equitable to the growers. Advances to settlers were liberalised. The poultry industry was protected to the extent of minimising, as far as possible, the incidence of disease. A practical scheme for the improvement of draught farm horses was launched successfully. Protection was given to farmers and orchardists in relation to specifics for insect pest destruction. Bird and animal sanctuaries were increased in number and area. The scientific and technical branches of the Department of Agriculture and Stock were extended, and the system of departmental publicity made more comprehensive in respect particularly to the effective filming of Queensland at work in rural industry as part of a considered scheme of rural educational propaganda. Legislation providing for organised marketing was also passed.

To the man on the land Agriculture and Stock is the most important of our administrative departments, and there are few countries in the world where the welfare of the farmer is more concern of efficient and experienced officers than in Queensland. In every phase of inland enterprise, guidance is freely given by men whose personal knowledge of local conditions in every district and practical experience are at the disposal of anyone embarking on a life on the land.

Through the Sugar Experiment Stations the canegrower has the benefit of scientific advice and field service on the farm in every branch of his calling. Cane varieties are tested under every-day conditions, and cane sets supplied to the farmer. Sugar-mills, on the boards of which growers are represented directly, have been established in every chief sugar district. The price of the product is regulated equitably by Cane Prices Boards, and through them every interest concerned is assured of a fair and square deal.

**Queensland, a pioneer in industry and settlement and social improvement, is also a pioneer in agricultural legislation.**

Specialists and graders give the farmer every possible assistance in respect to cotton cultivation, and the whole available resources of science and the services of a highly trained corps of scientists are at the call of the agriculturist in Queensland.

Queensland is the only country in the world in which dairying is conducted in the tropics successfully on a big scale. Ninety-eight per cent. of our butter production and 96 per cent. of our cheese output are produced co-operatively under farmer control.

Dairy instructors and inspectors operating throughout the producing regions are well equipped with the knowledge necessary to assist and inform the dairymen in every way. The dairy farmer has the advantage of expert advice on all matters relating to his calling, from sowing and improving pastures, through every phase of animal husbandry, to manufacturing, right to landing his finished product in cold store or on the London and other overseas markets. Herd testing and breed improvement each claim practical attention and direction.

Pig and poultry raisers are provided for amply in respect to expert advice. In every fruitgrowing district field instruction in cultivation, in contending with insect and vegetable pests, in grading, packing, shipping, and marketing, in the cultivation and marketing of tropical fruits, is available.

The service and advice of experienced veterinary surgeons are always available to any stockowner in difficulties or needing practical guidance in any way. Similar services are available in respect to sheep and wool. Clips up to 1,500 fleeces from any one holding are classed at nominal cost and prepared for the salesmen's catalogues. In this way the interests of the small flockowner are conserved and his clip presented to the buyer in the best marketable form.

In agricultural chemistry the Queensland farmer is served by men most eminent in their profession, and who form the staff of probably the best equipped laboratory of its kind in Australia. A special branch of the Department devotes itself to the protection of the farmer in respect to ensuring that seeds, stock foods, fertilisers, and specifics for pest destruction are kept up to prescribed grades and standards.

The excellent public services that have been established by the Queensland Government and are being extended to meet every development in agricultural progress in this State are detailed as follows:—

## WHAT THE DEPARTMENT IS DOING.

The Department of Agriculture is administrative, educational, and co-operative, the latter in so far that circumstances frequently call for the financing of rural enterprises as well as assistance to the individual farmer. The Government is always ready and willing to aid his industry in every practical way. Field practice, scientific research, and the economics of agriculture are all covered by the activities of the Department in its encouragement of primary industries.

### Agricultural Activities—State Farms.

Roma State Farm, situated some 4 miles from Roma, comprises 780 acres adjoining Bungeworgorai Creek. A considerable area is devoted to wheatgrowing, whilst the balance is used for fodder crops, orchard, and grazing purposes. This farm specialises in the breeding of wheat for Queensland conditions, and a number of the wheats now in cultivation in Queensland have been evolved at this farm. Additional promising varieties have recently been brought into cultivation.

Gindie State Farm, 15 miles from Emerald, in the Central district; area 16,000 acres. This farm is used principally for the breeding of beef Shorthorns, and a high-class stud is maintained. Two small horse studs—Suffolk Punch and Clydesdale—are carried on here. Young animals are bred at Gindie for the purpose of improving the stock of farmers and graziers, and the stud is continually being improved by the purchase of fashionably-bred sires.

**To the man on the land Agriculture and Stock is the most important of our administrative departments, and there are few countries in the world where the welfare is more the concern of efficient and experienced officers than in Queensland.**

Kairi State Farm, between 600 and 700 acres of typical scrub land, is situated in the heart of the Atherton scrub. Developmental work has been pushed on, and approximately 500 acres are now cleared, or in the process of clearing, and under grass. About 100 acres are cropped to provide grain and fodder for farm stock, and a number of miscellaneous and experimental crops are raised. The stock consists of Illawarra, Shorthorn, and Jersey studs, which are maintained for the improvement of district stock. A high-class Berkshire stud is also carried on, and a small stud of Tamworths has recently been established. A Suffolk Punch stallion is kept for the use of farmers in the district. A cane nursery has been instituted for the purpose of rehabilitating cane grown on coastal areas.

Home Hill State Farm, situated at Home Hill; area 311 acres, portion of which is capable of being irrigated, and is used mainly for the purpose of raising supplies of cane of new and approved varieties for distribution to local sugar farmers.

Field Experiment Plots.—A system of establishing experimental plots on various farms situated in the Northern, Central, and Southern districts was initiated a few years ago. Plots are established for variety trials, seed propagation, and seed improvement purposes.

Pasture Improvement Trials.—Latterly experiments have been carried out in the Northern and near North Coastal districts for the purpose of carrying out improvement trials in pastures, in combination with fertiliser experiments.

### Agricultural Operations Generally.

The Department provides expert advice in cultural operations, and this is at the disposal of the farmers in every district. For the purposes of administration the State is divided into three divisions—Southern Central, and Northern. A senior instructor with the necessary staff has been assigned to each division, and specialists are engaged in advisory and experimental work peculiar to each province.

### Wheat Propagation and Improvement.

A scheme of wheat propagation plots is carried on in conjunction with the Wheat Board, and its value has been proved particularly in regard to (1) the bringing of improved varieties into cultivation; and (2) the maintenance of purity

of type of wheats cultivated. In addition wheat experimental plot work is carried out in certain districts in co-operation with local growers. The results of this work are shown in improved yields and higher bushel weights.

The seed wheat raised and distributed by the Department has undoubtedly been of substantial economic advantage to the wheatgrowers of the State. The Director of Agriculture (Mr. H. C. Quodling) and his assistant (Mr. Clydesdale) have charge of this work.

In addition, paspalum pasture renovation work has been carried on, and sound results obtained. Added to this work was assistance in broom millet and maize seed selection, silage demonstrations, and dairy and pig fodder experimental work. Accounts of these activities are set out in the Departmental Annual Report.

### Maize Improvement.

Seed maize improvement work is being carried on systematically by Instructor C. McKeon, and among the more important results obtained under this head is the development of a special type of grain (''Durum'' Maize) suitable for growing in the moister regions, such as the Atherton Tableland.

### Other Crops.

Other crops that come within the range of practical field attention include peanuts, tobacco, potatoes, green manuring crops, cassava, arrowroot and sweet potatoes, onions, summer and winter fodder, sorghums, lucerne and other fodder crops, root crops, cotton, tomatoes.

Fertiliser and cultural trials have also been carried out in respect to these and other crops by and under the direction of the Senior Instructors in Agriculture in each Division (Messrs. Gibson, Brooks, and Pollock, respectively).

### Analytical Work.

The Agricultural Chemist and his staff are engaged throughout the year in analysing soils, waters, dairy and other produce, and other substances.

The Departmental laboratory is regarded as the most modern and best equipped in the Commonwealth.

**The whole available resources of science and the services of a highly trained corps of scientists are at the call of agriculturists in Queensland.**

The Seeds, Stock Foods, Fertilisers, and Pest Destroyers Investigation Branch has been established to safeguard the farmer from imposition in respect to the quality of these commodities when they are offered for sale.

This section of our scientific service to the farmer is very little known to the general public. In fact, it is a matter for wonder why public interest in science generally is usually so very small. It is rather extraordinary that this should be so since anybody who takes the trouble to inquire even into the history of scientific thought and method, and still more into that of any particular discovery or generalisation of economic value, is immediately struck with the peculiar pleasure to be derived from actual scientific pursuits. The indifference of the large mass of people to those pursuits which are designed especially to make them happier and more comfortable is remarkable. Is it because most of us prefer to be impressed rather than be convinced?

Though science enters into every phase of our existence, there does not seem to be any spontaneous recognition of the fact. Behind all our modern marvels, (radio, which is regarded is one of the miracles of the age, and the rest), there is a vast field of research, and behind all our progress in agriculture you will find the long and patient effort of the scientist to whose vision and energies we owe so much of our material wealth and every-day comfort.

The Chemistry Branch of the Department may well be described as a ''silent service,'' and like most services of that character its record is a record of work well done, of continued effort and continued achievement from which has come much of our wealth and progress in rural industry, which we are now beginning to recognise and properly appraise.

Our Agricultural Chemical Laboratory has, over the thirty years since its establishment, worked up from a one-man show to its present high state of efficiency, both in personnel and equipment.

Over a long series of years the Branch has performed much valuable work for the farmer, the results of which are readily available in many publications that are really text-books on the industry. That work covers improvement in fodders and grains and field crops generally; both fundamental and applied research in respect to fertilisers, pasture improvement, dipping fluids, pest destroyers, and stock foods. Among the most useful of the activities of this Branch was the work carried out in fertilising experiments for bananas on land which had been under cultivation for as long as fifty years, and which, through exhaustion, had become practically barren. By proper and thorough cultivation and manuring, the soil on this area, on principles and practice laid down by the Agricultural Chemist, was brought up to the fertility of virgin land.

In addition, a close survey of soils of agricultural districts has been made. This revealed in some districts a distinct depletion of plant foods, and the Chemist set out to correct them by demonstrating, to the advantage of the industry, the necessity of improving methods of cultivation and of using, judiciously, artificial fertilisers where their need was proved.

Added to all these avenues of investigation there is the regular routine work of the Branch, which covers, among other important work, a comprehensive series of analyses of great importance to the manufacturing as well as to the primary side of agricultural industry in Queensland. These analyses number many thousands in the course of the year, and include a wide range of tests among the chief of which are analyses of stock foods. The Chemist also collaborates with the agricultural specialists in carrying out a regular series of field experiments, pasture renovation and improvement, and fodder plot trials.

### Stock Nutrition Experiments.

Another very valuable investigation was made into a sheep problem, the main points of which were small lambing percentages and malnutrition. This led to the recommendation of a stock lick which has already through its use on several holdings doubled the stock carrying capacity, even in drought years, on certain areas. Other similar investigations that produced remarkable and satisfactory results have covered feeding experiments with sheep, to ascertain the percentage

**Queensland is the only country in the world in which dairying is conducted in the tropics successfully on a big scale. Ninety-eight per cent. of our butter and ninety-six per cent. of our cheese is manufactured co-operatively under farmer control.**

of digestibility of various common fodders under our climatic conditions; practical feeding experiments, which were carried out at Wallumbilla to get a true idea of the food value of prickly-pear when used for milk cows, steers, and sheep; an investigation on plants poisonous to stock, more particularly a full investigation on plants containing a hydrocyanic acid yielding glucoside, like those of the sorghum family and others; analyses of tanning contents of Queensland wattles and mangrove barks; and the inauguration of seed testing, which culminated in the establishment of a separate departmental seed-testing laboratory which is the most complete, up to date, and efficient in any of the States of the Commonwealth.

Reverting to the inquiry into the sheep problem presented by cases of malnutrition and lambing losses in the Central District, and as a solution of which the Chemist had recommended—as a result of his investigations—the use of a stock lick, this is what one grazier had to say in the course of a report on its effect—

"Since using this lick I have not seen a sign of sickness nor have I drenched for worm. My usual carrying capacity prior to using was about a sheep to 2 acres, or 40,000 sheep. Results have proved so satisfactory that I have gradually increased the numbers, until at the commencement of the 1926 drought I had 85,000; 15,000 went away in September, leaving 70,000 which are still all in good, strong condition, and from which there has not been more than the normal losses."

From results like that we get some idea of the economic value—the real money value—of the work of the Chemist, and what it means to the State; and also what agricultural science is doing for the industry in Queensland. And we also learn to appreciate the high public services of other good workers in the vineyard who,

through their field and laboratory effort, have accomplished much and have either gained or saved, actually or in prospect, for both the State and Commonwealth, many millions sterling.

**An Efficient Publicity Service.**

Before passing on to a consideration of other institutional factors in our rural progress, reference might be made to a difficulty that has always confronted the research worker and other technical workers in agriculture—that is the difficulty of getting widespread and speedy publicity for the results of their work. The application of the knowledge gained by research to daily farm practice must always be slow, but there is no reason why we should not do our best to speed up the process. The Department recognises this, and has provided an efficient publicity service which embraces the "Queensland Agricultural Journal" and leaflets and bulletins, all of which are issued by the Department of Agriculture to the farmer without charge.

**"A Nation of High Standards."**

Purely material resources, essential as they are, are worth little if the people who own them do not know how to use them. Intelligence, courage, and keen enterprise must be applied to the development of wealth from its crude to its finished form.

As Australians we have cheerfully and deliberately chosen to be a nation of high standards, and we have to just as cheerfully and deliberately pay the price of a high civilisation—as a matter of fact we must—in high average efficiency. In Queensland, so far as agriculture is concerned, it is our aim to get the best out of our job of developing a vast primary industrial State. The job is a big one, but we are learning to make the fullest use of the tools of education and intelligently controlled energy in a workmanlike way. In agricultural progress particularly in Queensland we have done pretty well so far, but naturally we have got to keep on evolving new ideas as to how we can do better, for modern conditions demand increased efficiency in every avenue of life, and increased efficiency means high standards, a high degree of comfort, and a complete national life.

**In agricultural chemistry the Queensland farmer is served by men most eminent in their profession, and who form the staff of probably the best equipped laboratory of its kind in Australia.**

## ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The first Primary Producers' Organisation Act was passed in 1922, and crystallised the Government's policy for the organisation of the farming community. The cost of the council was borne at the commencement by the Government, but by the amending Act passed in 1923 the council was empowered to make levies on primary producers for administrative and other purposes, subject to certain conditions, which included, in the case of special levies, provision for primary producers having a vote to decide whether or not a special levy should be made.

In the original Act the organisation was on the following basis:—A Local Producers' Association was formed in every centre where a minimum of fifteen primary producers decided on that course. The agricultural areas of the State were divided into nineteen districts, and all the Local Producers' Associations in a district had the right to elect a District Council. Each of the nineteen District Councils appointed one member to the Council of Agriculture, which in addition had the Minister as president and five Government representatives. From the working of the Council it was demonstrated that to have the organisation on a commodity basis would be preferable, and with this object in view the Act was amended in 1925 to permit of Commodity Boards having direct representation on the council.

As the change was somewhat in the nature of an experiment, the actual details of the system of reorganisation were left to the Governor in Council, and as a result the new council was organised in October, 1925, on the basis of—

8 representatives from 8 District Councils,
8 representatives from 8 Commodity Boards,
4 representatives of the Government,
1 Minister as president,

21 in all.

The experience of the change was of such a nature that in 1926 the organisation by legislative enactment was put wholly upon a commodity basis. Each industry has now the full control of its own affairs, and the farmers elect their own different boards, and each of them functions with full authority in its own particular industry. From the various Commodity Boards representatives are chosen who act on the Council of Agriculture. The power of the Council of Agriculture to raise levies has been removed and diverted to the Commodity Boards, which finance the Council by means of precepts.

Since the inception of the Council of Agriculture in 1922, up to the 30th June, 1927, the Government assisted the council to the extent of £103,481.

In 1926 the Primary Producers' Organisation and Marketing Act was passed, and this was primarily a consolidation of and improvement upon the then existing Primary Producers' Organisation Acts and Primary Products Pools Acts, which were both repealed, but in the consolidated Act there have been retained the principles of both repealed measures, but the organisation of primary producers is now on the following basis:—

(1) There is a Council of Agriculture.

(2) The Council is composed entirely of representatives of each of the Pool Boards and Commodity Boards. This means that the producers are organised entirely on a commodity basis, and the actual council at present consists of an elective chairman; the Director of Marketing; two representatives of the Butter Board; and one representative each of the Queensland Cane Growers' Council, the Egg Board, the Broom Millet Board, the Committee of Direction of Fruit Marketing, the Peanut Board, the Cheese Board, the Wheat Board, the Cotton Board, the Atherton Tableland Maize Board, the Arrowroot Board, and the Northern Pig Board.

In 1928 occasion was taken to amend the "*Primary Producers' Organisation and Marketing Act of* 1926," with the result that all our agricultural organisation legislation has now been widened and consolidated. The provisions of the Act are now applicable to all primary industries including fruit and wheat.

**The Department of Agriculture and Stock is administrative, educational, and co-operative. The Queensland Government is always ready and willing to aid agriculture in every practical way.**

## Pools in Operation.

Some idea of the scope of marketing by controlled boards in this State is contained in the following facts and figures, which show the value of the various commodities controlled by each Commodity or Marketing Board (the figures being those for the year 1927):—

| | £ |
|---|---|
| Sugar-cane | 7,108,907 |
| Butter | 5,024,957 |
| Fruit | 1,915,079 |
| Cheese | 560,355 |
| Wheat | 1,040,486 |
| Cotton | 144,576 |
| Eggs | 274,740 |
| Atherton Maize | 165,336 |
| Arrowroot | *20,244 |
| Atherton Pig | 16,200 |
| Canary Seed | 11,109 |
| Peanuts | 108,662 |
| Broom Millet | 18,270 |
| Total value | £16,408,921 |

*Approximately.

Those figures indicate that a very large volume of agricultural production of Queensland is controlled by marketing boards exercising powers conferred on them by legislation passed in this Parliament. The value of agricultural production of the State, including dairying, poultry, and bee farming, for the year ended June 1926, amounted to £18,932,840. Of this amount agricultural products to the value of £14,770,936, or 78 per cent., were under the control of commodity or marketing boards. However, it may be said that in any one year approximately three-fourths of the annual value of the agricultural production of Queensland is marketed through the pooling system. The general policy has been uniformly successful from its inception. There is no single case of any marketing board having been unsuccessful in its operation, and all have been maintained on a sound financial basis. From time to time the Government has either made advances of credits to these boards or has guaranteed credits. In other cases financial institutions, without any guarantee from the Government at all, have provided them with the necessary fluid capital to carry on their operations. In every case these marketing boards have met their obligations, and not one penny of Government guarantee has been called up. All that indicates a very healthy state of affairs with regard to this form of policy, and justifies the Government in continuing this line of activity.

**The Department of Agriculture and Stock provides expert field advice, and this is at the disposal of the farmer in every district of the State.**

**Favoured by Producers.**

Further tangible evidence of the confidence of the producers in the pooling system is the fact that, when votes have been taken on the question of the continuance or otherwise of an existing pool, an increasing percentage is invariably noted in the number of producers for the carrying on of the pool concerned. For example, the several pools now operating have been adopted on the following majorities:—

Arrowroot, established in 1922 without any opposition.

Atherton Maize, established in 1923 without any opposition.

Northern Pig, established in 1923 without any opposition; renewed in 1926 without any opposition.

Broom Millet, established in 1926 without any opposition.

Butter, established in 1925 by a 75 per cent. majority; renewed in 1928 without any opposition.

Canary Seed, established in 1925 by a 75 per cent. majority; renewed in 1928 without any opposition.

Cheese, established in 1922 by a 91 per cent. majority; renewed in 1925 without any opposition; renewed in 1927 without any opposition.

Cotton, established in 1926 without any opposition.

Eggs, established in 1923 by an 87 per cent. majority; established in 1925 by a 73 per cent. majority; renewed in 1926 by a 66⅔ per cent. majority.

(That indicates a falling-off in the percentages of those in favour of pooling, which is often due to a greater number of poultry farmers being brought within the ambit of the pool.)

Peanuts, established in 1924 without any opposition; renewed in 1925 without any opposition; renewed in 1926 by a 90 per cent. majority.

Stanthorpe Tomatoes (superseded by Committee of Direction), established in 1922 by a 78 per cent. majority.

Wheat (under the Wheat Pool Act), established in 1921 by a 97½ per cent. majority; extended in 1924 by an 89 per cent. majority; extended in 1928 without any effective opposition.

It is of interest at this stage to refer briefly to the operations of the Sugar Board and the Butter Board, which can be regarded as having the control on the marketing side of two of the State's most important agricultural industries.

**Butter Board.**

This was constituted on the 19th February, 1925. It applies to the whole State, and the Government guaranteed the pool £600 for preliminary administrative expenses.

The Queensland Butter Pool controls the marketing of all butter sold within the State by fixing prices and licensing wholesale agents. It does not actually handle butter itself. The board practically acts as an accounting body, and particulars of the prices realised for butter by wholesale agents are conveyed to the Pool Board, who in turn adopt means for equalising (so far as export and local sales are concerned) the wholesale prices to factories throughout the State. The equalisation scheme adopted by the Queensland Butter Pool is worked in conjunction with the Commonwealth Patterson Scheme.

The operations of the Butter Pool Board have resulted in dairy farmers benefiting to the extent of £493,585 over and above the prices received by dairymen in Victoria, New South Wales, and London parity, as distinct from any material advantages that may have accrued as the result of the operations of the Patterson Scheme.

**The Department is associated with the producers in further improving the conditions of primary industry in respect to marketing both at home and oversea.**

**Dairying.**

As late as the year 1900 the quantity of dairy produce marketed in Queensland was insufficient to meet the domestic requirements of the population, but since that time this branch of husbandry has developed at a rate unequalled probably in any other part of the world. Twenty years ago there was not enough butter produced in this State to provide a cargo for a small coastal steamer on which a refrigerating plant had been installed with the idea of conveying Queensland butter to Sydney for transhipment overseas. To-day the largest ocean liners visiting the port of Brisbane load butter cargoes direct from the Departmental Cold Stores at Hamilton.

Moreover, Queensland butter has won and retains a most favourable reputation on the overseas market, and has frequently secured first place for quality in open competition with the world's butter-producing countries.

In twenty years, largely on account of the work of the Agricultural Department, dairying has developed into a national industry next to sugar in annual value.

In 1911 Queensland produced 27,800,000 lb. of butter and 3,718,257 lb. of cheese. In the year 1921 (taking the ten-year period) the production of both commodities rose to 60,900,000 lb. and 15,000,000 lb. respectively, and in addition 15,000,000 lb. of condensed milk were produced in the latter year. In the course of the decade production more than doubled. The latest figures are (1927-28)—butter 69,464,414 lb., cheese 14,009,606 lb.

The monetary value of the industry increased from £2,250,000 in 1911 to £7,250,000 in 1927. Fifteen years ago there was no appreciable production of cheese, but to-day, largely through the inspiration and energy of the Department, Queensland is now the biggest cheese exporting State in the Commonwealth.

The development of dairying is more dependent upon efficient team work than upon individual effort, and to achieve the extraordinary success outlined it was necessary for the producer, the manufacturer, selling agent, and Departmental officers to work together harmoniously, and of these the lastmentioned was not the least important.

The progressive dairy farmer realises that high-producing cows increase profits and to this end he is co-operating with the Department in extending herd-testing operations.

The Dairy Cattle Improvement Subsidy Scheme is being availed of by dairy farmers, and through it the number of high-class sires among out dairy herds has been increased.

New Regulations under "*The Dairy Produce Act of* 1920" provide for higher technical training and efficiency of factory staffs.

The Department is now associated with the producers in further improving the conditions of the industry in respect to marketing both at home and oversea; applying modern methods to dairy practice and animal husbandry; and adding to the butter fat production of our dairy herds.

I want to give some figures with regard to the prices to farmers taken from the report of the Queensland Farmers' Co-operative Association Limited, for the year ended 30th June, 1928. The success of its operations can be regarded as typical of the progress that has taken place in the dairying industry in Queensland. The figures given in the return show the total amount of butter manufactured by the Association since its inception, the amount paid to its suppliers, and the average price paid per lb., all grades.

An analysis of the return indicates that for the period from 1902 to 1914 inclusive—a period of fourteen years—the average price per lb., all grades, paid by the Association to its suppliers ranged from a minimum of 7¼d. per lb. to a maximum of 11½d. per lb., whilst from 1915 to 1928 inclusive—a period of fourteen years—the average price per lb., all grades, paid to suppliers ranged from a minimum of 1s. 1¼d. per lb. to a maximum of 1s. 10¾d. per lb.

Averaging the prices paid each year from 1902 to 1914, gives an average price paid during the period under review of 8.98d. per lb., whilst on the same basis, for the second period, from 1915 to 1928—under a Labour Government—the average price paid to suppliers amounts to 15.76d. per lb., or a direct increase in return to the dairy farmers of 77.5 per cent.

The Commonwealth "Year Book," No. 20 for 1927, comments thus on the expansion in recent years of the dairying industry in Queensland, and the influence such increased production has had upon the output for the Commonwealth as a whole—

"The marked development of dairying in Queensland, where the butter production has nearly doubled since 1913, was responsible for the largest share of the increased butter output in Australia, while Victoria and New South Wales also made important contributions to the general progress."

**Queensland is the one country that produces cane sugar successfully by white labour. The industry pays more than six millions sterling annually in wages to White Australian workers.**

## The Sugar Board.

This Board does not come under the Pools Act. The Commonwealth Government relinquished control of sugar as from the 30th June, 1923, but agreed to a two years' embargo subject to the formation of a Queensland Sugar Pool. The Queensland Government acquired the 1923 season's sugar by proclamation under the Sugar Acquisition Act, and established an Advisory Board on which the Queensland Government, the Australian Sugar Producers' Association, the United Cane Growers' Association, and the millers had one representative each.

The Pool Board, which was constituted in July, 1923, took over from the Commonwealth the surplus sugar on hand at 30th June, 1923. It also completed arrangements with the refining companies for the refining and distribution (for Australian requirements) of the surplus sugar and the 1923 production. The Board was successful in obtaining reduced rates for the carriage of the raw sugar from Queensland ports to refineries. The Pool Board acts for the raw sugar millers collectively in connection with the refining and selling of the product, instead of the individual millers, as in previous days, making separate selling agreements.

The original two years' embargo against the importation into the Commonwealth of black-grown sugar was renewed in 1925 and again in 1928, and will be in operation until August, 1931, to which date the Sugar Board's appointment was also extended.

## The Sugar Industry.

Queensland is the one country that grows sugar-cane successfully by white labour under white labour conditions. The industry pays more than six millions sterling annually to white Australian workers. Sugar has been an important factor in building up other industries, the export of which amounts to £17,000,000 annually.

The industry employs over 20,000 people and more than 100,000 persons are dependent upon it. The capital invested in it amounts to £16,000,000 exclusive of working capital.

In 1871 there were only 9,581 acres under cane. In Queensland to-day the cane area is well over 200,000 acres.

In 1914 sugar-growing was a struggling industry. It is now one of the most efficient in the Commonwealth. In 1914 the tonnage of sugar manufactured was 225,847. The average annual tonnage of sugar manufactured for the last two years reached over 400,000 tons.

This extraordinary development in this one industry alone was due in a very great measure to the organisation, inspiration, support, and continued encouragement of the Queensland Agricultural Department. Sugar Experiment Stations have been established in the several cane-growing districts, and scientific agricultural principles, relating principally to plant breeding, selection, fertilisation, and cultivation, are being applied widely and successfully by officers of the Agricultural Department.

**All the machinery possible for thorough organisation and distribution and marketing of primary products has, largely through the Department of Agriculture and Stock, been placed at the disposal of the Queensland farmer.**

## OTHER DEPARTMENTAL ACTIVITIES.

### Farmers' Wool Scheme.

The Farmers' Wool Scheme is being used by very many more of the smaller holders this year than ever before. There were rarely 100 bales in the store before Christmas, but this year there are many more bales of finished wools in brokers' hands, and remaining to be handled. The greater quantity consigned to the Department has always come in the New Year.

Sheep on the coastal areas are increasing in numbers and sheep-raising there has gone considerably past the experimental stage. The services of Departmental instructors in sheep and wool are at all times available to the small flock owner.

### Pig Raising in Queensland.

Pig raising is an important industry, particularly in those districts in Southern Queensland in which dairying and mixed farming are carried on, and on the Darling Downs and other wheat-growing areas.

### On the Atherton Tableland.

The industry is becoming of importance on the Atherton Tableland and the Cairns hinterland districts, and in both Northern and Central Queensland. The Northern Pig Board, controlling the marketing in the important pig-raising areas of the North, functions satisfactorily, and now that the Board has been granted an extension of time over which to organise the marketing of all available pigs, success in this industry is assured. There can be no doubt that the organisation of the industry in the far Northern districts and the establishment of the farmers' own co-operative bacon factory has placed the industry on a permanent basis, and has assured for the producer a reliable market outlet for all the pigs he cares to make available for handling by the Board. This permanence, and the fact that the Board has been able to finance satisfactorily and return to the producer payable prices, has meant a rapid increase in the number of pigs produced, and it is safe to say that at no previous stage in the history of the Atherton Tableland have matters been so satisfactory and prosperous as they are in the pig-raising industry there to-day.

### Stud Pigs at the State Farm, Kairi, Atherton Tableland.

The State Farm at Kairi continues to produce, and make available to farmers at reasonable prices, stud pigs of the Berkshire and Tamworth breeds. Visitors, especially farmers, are always welcomed and are given every facility for inspecting the stock and the operations of the farm.

### The Bacon Business.

Though this industry, in common with many other agricultural industries, suffered a severe set-back as a result of the long-continued dry spells during 1926-27, conditions are rapidly returning to normal. The whole of the eight bacon factories operating in Queensland now report an increasing supply of better quality prime-conditioned bacon pigs, with good prospects for a continuance of supplies.

### Fresh Pork Trade.

There is also an increasing demand for fresh pork both for local consumption and for export. Several of the meat export firms have engaged in the export of frozen pork with satisfactory results. This is a branch of the business well worth fostering, for there are extensive markets overseas for pork products. Indeed, the export of bacon is under consideration by various factories throughout this and other States.

### Australian Pig Industry Council.

The prospects ahead of the pig industry, and the need for investigation into the conditions ruling on the local and overseas markets, has led to the formation of the Australian Pig Industry Council and the Queensland Pig Industry Committee, on both of which Departmental officers have a seat. These committees are composed of delegates representative both of producing and manufacturing interests, as well as of State and Commonwealth Departments, and are charged with the responsibility of co-operating wherever and whenever possible in an endeavour not only to extend local markets and production but to foster the export trade and place the industry on a more permanent and lucrative basis. State committees also function in the other States.

### Fruit.

In respect of legislation, the Fruit Cases Act has been discarded in favour of a new measure, "*The Fruit and Vegetables Act of* 1927," which is calculated to materially improve marketing conditions, both for the producer and purchaser.

The Diseases in Plants Act has remained unaltered, with the exception of additional proclamations prohibiting the transference of banana plants into areas in which diseases are not known to exist.

"*The Primary Produce Experiment Stations Act of* 1927," has for its object the establishment of experimental stations for the purposes of experimentation with the different fruit crops from practically all aspects, including varieties, cultural and manurial, fruit transport, &c., taking each fruit separately and commencing with bananas. Demonstration plots have been established and are still being conducted in respect to citrus, pineapples, and strawberries, where the methods of the Department are applied for the information of fruitgrowers generally.

### Diseases in Live Stock.

The Department supplies large quantities of preventive vaccines to stock-owners, such as quantities of pleuro-pneumonia virus and blood for immunisation against redwater, blackleg vaccine, and contagious mammitis vaccine.

Active measures have been taken to prevent the further spread of the cattle tick into clean areas.

The inspection and registration of stallions is now being carried out by a Central and Southern Queensland Board. In time the effect of this legislation should be fully realised, as the inspections and examinations are for the purpose of preventing the carrying on of hereditary diseases, such as side bone, ring bone, and spavin.

The testing of dipping fluids is carried out free of cost to all owners of dips, so that the farmer can be assured of the strength of the solution he is using on his stock.

Strict measures are taken to ensure a healthy meat supply under hygienic conditions.

### Poultry Raising.

Poultry raising still continues to increase in value in Queensland, and during the present year the oversea export of eggs has exceeded that of any previous season. Primary producers generally are giving more consideration to the keeping of poultry as an adjunct to their general farming operations, while the practice of commercial poultry farming has extended considerably.

There is no doubt that the existing marketing condition, made possible under the Primary Producers Pools Acts, is directly responsible for the development of this industry. It is estimated that approximately 3,000,000 dozens of eggs will be handled by the Pool Board and its agents during the present year, and it will readily be understood that the stability of the industry is only made possible by organised marketing of this large quantity in a city with a population of 275,000. Especially is this so when thousands of householders keep a sufficient number of birds, not only to supply their own requirements, but have a surplus which they usually trade with their grocer.

The Government is not unmindful of the possibilities of the industry, and have associated with the Department of Agriculture and Stock a Poultry Expert, and with the Department of Public Instruction a Poultry Instructor, while the Department of Public Lands has an attendant whose duty it is to attend to the large public hatchery at Mount Gravatt. In addition an Inspector of Poultry has been appointed, while provision has been made by the Department on estimates of this year for an assistant instructor.

### Wheat.

Wheatgrowing has received attention at the same time and the annual Queensland yield has reached as high as 4,000,000 bushels, worth over £1,000,000. Over a ten-year period, as a result of the activities of the Department and the investigations and practical work of its specialist officers, the average yield per acre has exceeded that of other wheat-growing States, excepting Tasmania, and the distinction of obtaining the highest average yield per acre (20.91 bushels) belongs to Queensland.

The results of wheat breeding and cultural tests by the Departmental officers are evident in improved milling tests and a wide range of newer varieties suitable to Queensland conditions. The Queensland wheat-grower is not a one-crop man, and he usually engages in diversified farming including lamb-raising, pig-raising, and dairying. In all these branches the scientific and specialist training of our field officers are at the disposal of the man on the land.

### Cotton.

After the cotton collapse of the seventies small attempts to resuscitate the industry were made at different times, but these attempts were only spasmodic. In 1920 cotton growing in Queensland was little more than a mere memory. In that year the Department initiated a strong revival. It erected a cotton-gin at its headquarters in Brisbane which enabled growers to have their seed cotton treated economically and prepared for market. The Department directed its energies towards re-establishing the industry on a sound basis. Protective legislation was passed. Specialists were engaged as demonstrators and instructors. It is a branch of agriculture that has been beset with many difficulties, but in face of them the Department has succeeded in placing it on a firm commercial basis, and under Departmental guidance it now shows every prospect of becoming an important and thriving source of agricultural wealth. This is evident in the definite result that, through it, much new wealth is added annually to Queensland. The industry is capable of almost limitless expansion and cotton-growing is coming to be regarded as a valuable subsidiary crop in many districts. Individual farmers, mostly growing small areas under cotton, now number 6,000. The industry is controlled by the Cotton Board which is elected by the growers.

## DEPARTMENTAL ORGANISATION—A REVIEW.

The Department is organised along sound administrative, commercial, and educational lines. The several branches, each with a technical head and a staff of competent instructors and inspectors, cover every phase of farming from field work to scientific laboratory investigation. For experimental and practical demonstration work State farms, controlled by Departmental officers, have been established in selected districts. On these farms the breeding and propagation of cereals and other crops suitable to Queensland conditions, both temperate and tropical, strict stock breeding (cattle, horses, sheep, and pigs), irrigation, and every other branch of modern farm practice are carried out. In addition to their general utility, these farms are also designed as educational centres where the latest ideas of husbandry can be tested and applied. Extension of this work is provided for in experimental plots on selected farms in the several districts on which, with the co-operation of the farmers themselves, field crop trials are made, the results of which are recorded carefully for the general guidance, both of the Department and the farmers.

Sugar experimental stations have been established in the chief sugar-growing regions with the object of improving the quality of cane, testing values of, and demonstrating different methods of cultivation, and also for carrying out fertilising and other experiments. General scientific research is also an important feature of the activities of these stations. For investigating diseases and pests of sugar-cane a sugar investigation station has also been established. These stations are having a very big influence on the prosperity of the State's chief agricultural industry.

Stock Experiment Stations have been established in the Northern and Southern divisions of the State for the purpose of investigating stock diseases and keeping the farmers informed in respect to modern developments in animal husbandry in all its branches. Other Departmental activities cover horticulture in all its branches; grading, packing, transporting, and marketing all primary commodities; supervision of imports and exports of primary products, both in raw and manufactured forms; assurance of benefit to the farmer by the strict enforcement of the Fertilisers, Stock Foods, Pure Seeds, and other related Acts; making available to the farmer the technical and advisory services of the Agricultural Chemist and his staff; making available to stock raisers the services of an experienced bacteriological and veterinary staff, particularly in relation to stock pests and diseases; and administering the Brands Act, the Dingo and Marsupial Act, and the specific legislation affecting the agricultural industry in all its ramifications.

Another feature of the functions of the Department is a system of effective publicity. The "Queensland Agricultural Journal" serves as an effective vehicle for current, technical, and topical information on farm affairs and problems. Pamphlets on technical subjects by technical officers and advisers are regularly published. Queensland at work in the rural industries has been filmed effectively and released for exhibition at home and abroad, and all the latest methods of publicity and the discoveries of modern science are pressed into the service of the Department on behalf of Queensland farmers.

**Organised marketing boards in Queensland have in every case met their obligations. Not one penny of Government guarantees has been called up. This indicates a very healthy state of affairs.**

A highly-trained entomological and pathological staff deals with the problems of insect infestation and plant diseases affecting Queensland's internal economy.

A Co-operative Wool Classing and Selling Scheme operates under the Department for the benefit of the small sheep farmer. To sum up then the activities of the Department may be summarised as follow:—

*Scientific—Technical and Instructional.*—Employment of scientific investigators for special problems (blow fly, fruit fly, banana beetle borer, bunchy top, &c.). Agricultural chemistry in all its branches. Instruction in the field in every branch. Plant and live stock improvement, including:—Wheat-breeding and propagation plots, maize improvement, pasture improvement. Scientific investigation of animal and plant pests and diseases. Dairy and farm management. State studs—Horses, cattle, pigs. General crop improvement (cereals, forage, roots, vegetables, fruits, vines, and legumes). Testing of commercial and industrial plants (Cassava, &c.). Animal husbandry in all its branches. Fodder conservation.

*Commercial.*—Classing and marketing of farmers' wool clips. Formation of Primary Products Pools. Encouragement and financing of Farmer Co-operative enterprises. Extending the activities of the Advances to Settlers Board. Administration of Cane Prices Boards. Administration of Commodity Boards. Ensuring the supply to the farmer of pure seeds, stock foods and fertilisers. Controlling dairy produce from the pastures to places of shipment. Raising and maintaining high export standards. Exploiting and development of new markets. Assistance to Co-operative Butter Factories and other kindred enterprises. Guaranteeing cotton prices. Co-operating with the Commonwealth in marketing matters and other branches of agricultural economics.

*Legislative.*—By special and general legislation on the initiative of the Department the agricultural industry has been more or less stabilised. Rural legislative record in Queensland has been unequalled in any other State. In one session (1923) as many as twelve measures initiated by the Department relating to farming interests

were passed into law. Some of these measures have since been amended to provide for altered circumstances and to more effectively safeguard or extend the interests of the agriculturist.

All the machinery possible for thorough organisation and distribution and marketing of products has been placed, largely through the agency of the Department, at the disposal of the farmer.

*Publicity.*—Recognition of the value of appropriate publicity, particularly in relation to the marketing of products has been recognised in—Radio service, industrial films, free issue of Departmental publications.

*General.*—The practical recognition and supply of the needs of the agricultural industry in all its phases, the conservation of the rights of farmers to a fair and reasonable return for their enterprise, and everything else that will bring agriculture into line with the State's most profitable industries. Departmental success that is the result of a broad visioned policy, allied with administration in sympathy with its peculiar needs, is inextricably woven with the fortunes of the agricultural industry in Queensland.

**Co-operative organisation, wisely managed and efficiently controlled, will reduce costs and ensure to the farmer a more equitable return for his energy and enterprise.**

## A POLICY FOR THE FUTURE.

I have indicated at some length the scope of the activities of the Department of Agriculture in its relation to the economic life of the agricultural industries of this State. We have provided all the necessary legislative machinery to assist in the extension of agriculture with a view to improving the condition of those engaged in primary production. Co-operative activity is the most significant social and economic factor in the life of the community to-day, and according to the manner in which it is developed and controlled so will the future of the various industries be determined.

**It must be remembered, however, that in dealing with co-operative organisation the words "co-operative" or "organisation" of themselves do not confer any benefit. For any benefit to be conferred by a new form of organisation it must be more efficient than the form of organisation which it seeks to displace.**

### Marketing.

Co-operative organisation wisely managed and efficiently controlled, by eliminating waste in various directions, can reduce costs and enable a greater return to accrue to the farmer. By well-devised and orderly marketing gluts can be prevented, depressions guarded against, and in countless different ways orderly marketing or orderly supply of goods to a market can be of benefit to all concerned. Why should the farmer be the only individual who has no control over the marketing of his own produce? Almost every other form of human activity that produces has some foreknowledge of the marketing conditions. The demand that there will be for a given product in a given market at a given time can be estimated with a degree of accuracy; and organisation can be so effected as to supply that market regularly with a view to preventing low prices and gluts from time to time.

### Organisation and Orderly Control.

These are the days of organisation and orderly control; and if that organisation and control are carried out in a manner not detrimental to the public interest, it will be of distinct benefit to society. Most of the difficulties in the world at the present time are due to bad organisation in production and distribution. Where production exceeds consumption under a given form of organisation, periods of trade depression follow with resultant difficulties to all concerned. With modern methods and machinery, the productive power of mankind in industry has increased enormously. Production can be carried on with greater rapidity than consumption can overtake it; and, as a result, we have a cycle of recurring trade depression within a narrow ambit of social organisation. Therefore, the remedy is orderly marketing and orderly control of industry with a view to estimating and supplying human needs.

**Better Conditions for the Farmer.**

Orderly marketing by a scientific organisation, which can be established under the Primary Producers' Organisation and Marketing Act, will enable the farmers, provided they use it properly, to obtain better conditions for themselves, and by those better conditions better organisation, improving the conditions of the great mass of the people generally, and thus be of benefit to the nation as a whole. Gluts are no good to the farmers. They mean that, when he has large crops, either through bad organisation or bad marketing, he gets a very small price, and on some occasions no worth-while price at all. In other cases when values are high he has little or no produce to sell. Those methods are bad both for the farmer and for the people who consume his produce. Of course, climatic conditions cannot be completely controlled, but I am satisfied that, with the application of proper methods, many of these difficulties can be removed.

I look to the farmers and those interested in agriculture generally to be loyal to their own organisations, to help so far as is in their power to place them on a better and more stable footing; to elect leaders distinguished for their honesty of purpose, vision, and capacity, and to co-operate also in all the efforts that are being made by my Department to improve the standards of production and efficiency generally in industry.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER, 1928 AND 1927, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Nov. | No. of Years' Records. | Nov., 1928. | Nov., 1927. | | Nov. | No. of Years' Records. | Nov., 1928. | Nov., 1927. |
| *North Coast.* | | | | | *South Coast*—continued: | | | | |
| | In. | | In. | In. | | In. | | In. | In. |
| Atherton ... ... | 1·95 | 27 | 5·54 | 0·20 | | | | | |
| Cairns ... ... | 3·84 | 46 | 7·11 | 0·43 | Nambour ... ... | 3·87 | 32 | 0·64 | 6·87 |
| Cardwell ... ... | 3·97 | 56 | 9·43 | 0·77 | Nanango ... ... | 2·61 | 46 | 3·22 | 2·56 |
| Cooktown ... ... | 2·59 | 52 | 4·39 | 0·50 | Rockhampton ... | 2·18 | 41 | 1·70 | 3·42 |
| Herberton ... ... | 2·43 | 41 | 5·15 | 1·30 | Woodford ... ... | 3·21 | 41 | 1·69 | 4·87 |
| Ingham ... ... | 3·43 | 35 | 13·89 | 1·25 | | | | | |
| Innisfail ... ... | 5·96 | 47 | 13·68 | 2·46 | | | | | |
| Mossman ... ... | 3·36 | 15 | 13·51 | 1·13 | | | | | |
| Townsville ... ... | 1·78 | 57 | 3·59 | 0·08 | *Darling Downs.* | | | | |
| | | | | | Dalby ... ... | 2·66 | 58 | 2·70 | 4·41 |
| *Central Coast.* | | | | | Emu Vale... ... | 2·67 | 32 | 1·09 | 2·75 |
| | | | | | Jimbour ... ... | 2·33 | 40 | 3·99 | 4·17 |
| Ayr ... ... ... | 1·64 | 41 | 3·96 | 0·69 | Miles ... ... | 2·40 | 43 | 2·25 | 3·45 |
| Bowen ... ... | 1·27 | 57 | 3·49 | 1·07 | Stanthorpe ... | 2·73 | 55 | 1·73 | 4·03 |
| Charters Towers .. | 1·41 | 46 | 5·04 | 0·06 | Toowoomba ... | 3·27 | 56 | 1·63 | 4·85 |
| Mackay ... ... | 2·85 | 57 | 10·75 | 2·28 | Warwick ... ... | 2·60 | 63 | 2·02 | 4·66 |
| Proserpine ... ... | 2·72 | 25 | 6·53 | 1·66 | | | | | |
| St. Lawrence ... | 2·22 | 57 | 5·29 | 1·89 | | | | | |
| | | | | | *Maranoa.* | | | | |
| *South Coast.* | | | | | | | | | |
| | | | | | Roma ... ... | 2·07 | 54 | 1·52 | 2·59 |
| Biggenden ... ... | 2·68 | 29 | 2·03 | 3·98 | | | | | |
| Bundaberg ... ... | 2·53 | 45 | 1·49 | 5·28 | | | | | |
| Brisbane ... ... | 3·74 | 77 | 2·90 | 5·82 | *State Farms, &c.* | | | | |
| Caboolture ... ... | 3·38 | 41 | 1·73 | 8·21 | Bungeworgorai ... | 2·06 | 14 | 1·06 | 1·47 |
| Childers ... ... | 2·68 | 33 | 1·51 | 3·73 | Gatton College ... | 2·79 | 29 | 1·77 | 4·53 |
| Crohamhurst ... | 4·37 | 35 | 0·91 | 7·23 | Gindie ... ... | 2·05 | 29 | 2·65 | 2·50 |
| Esk ... ... ... | 3·24 | 41 | 1·68 | 6·87 | Hermitage ... | 2·69 | 22 | 1·30 | 2·97 |
| Gayndah ... ... | 2·84 | 57 | 1·93 | 6·89 | Kairi ... ... | 1·82 | 14 | 6·14 | 0 |
| Gympie ... ... | 3·14 | 58 | 1·38 | 4·16 | Sugar Experiment Station, Mackay | 2·53 | 31 | 6·87 | 3·15 |
| Kilkivan ... ... | 2·54 | 49 | 1·37 | 2·31 | Warren ... ... | 2·96 | 14 | 4·17 | 1·70 |
| Maryborough ... | 3·10 | 56 | 0·91 | 3·86 | | | | | |

20th December, 1928.

J. H. HARTSHORN,
Acting Divisional Meteorologist.

# Bureau of Sugar Experiment Stations.

## A BUNDABERG EXPERIMENT PLOT.

An experiment plot on Mr. Knudsen's property at Bonna was initiated in 1926 at the request of the Branyan Farmers' Association. The area occupied is one acre, and is situate on the river bank. This was divided into four plots as under:—

Plot 1—Planted with cowpea, ordinary ploughing.

Plot 2—Planted with cowpea, and subsoiled.

Plot 3—Planted with cowpea, not subsoiled, but mixed manures applied.

Plot 4—No cowpea, manures, or subsoiling. (Check plot.)

The cowpea on plots 1, 2, and 3 was planted in October of 1926, and it was intended to plant the cane in March, 1927. Owing to the very heavy rain at that time planting had to be postponed till August of that year.

The following table shows the results:—

| Plot No. | Treatment. | Weight of Cane per Acre in English Tons. | Weight of Commercial Cane Sugar per Acre in English Tons. |
|---|---|---|---|
| 1 | Ploughed four times to 10 inches and planted with cowpea | 40·30 | 5·39 |
| 2 | Ploughed four times and subsoiled to 18 inches; planted with cowpea | 42·11 | 5·60 |
| 3 | Ploughed four times to 10 inches and planted with cowpea and fertilised at following rate per acre, viz., sulphate of ammonia 200 lb., sulphate of potash 100 lb., and meatworks 300 lb. | 49·05 | 5·99 |
| 4 | Four ploughings only to 10 inches .. .. | 39·40 | 4·44 |

The results are extremely satisfactory, the cost of treatment not being excessive. The yield of the manured plot gave an increase of 9.65 tons of cane above the check plot (No. 4) for an expenditure for manure of £4 15s. per acre.

The work throughout was performed in a most competent manner by Mr. Knudsen and his sons, to whom the thanks of the Bureau are due.

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## QUEENSLAND'S PRINCIPAL INSECT PEST OF SUGAR-CANE.

*The Entomologist at Meringa (Mr. E. Jarvis) has submitted the following report for the period, November to December,* 1928, *to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:*—

In these matter-of-fact days one is apt to disregard the air of seeming mystery or romance which invests or surrounds a big emergence of "greyback" cane beetles from fertile soils of the Cairns district, immediately after a tropical downpour during November or December.

The truth of those well-known lines "The poetry of Earth is never dead," finds, I think, abundant expression in such an appearance of insect profusion; when myriads of winged creatures responding to nature's magic touch, and being moved collectively, as it were, by some common but irresistible impulse, simultaneously forsake their subterranean pupal chambers, and hastily tunnelling upwards to the surface enter upon their brief aerial existence:—

"In wild abandonment 'mong mystic shades,
To court the golden hours, and taste the joys
Of that strange wonderland."

The metamorphosis of insects has long occupied the close attention of entomologists; but, although science is able to accurately figure and describe the differences in structure, form, and coloration of a species, and to some extent, through study of its internal anatomy, trace the final phases of transition or development from the pupal to the imago or perfect condition, we cannot explain how it happens that a lowly caterpillar, fitted only to crawl over and feed upon leaves or other food of a vegetable nature, should finally transform into a glorious honey-sipping butterfly attired in those rainbow tints or metallic colours which invariably excite universal wonder and admiration.

How different again, is our common cane grub, that lives for six or seven months in darkness underground, almost mechanically ingesting soil day by day in order to extract from it organic matter, or devouring the succulent roots of sugar-cane and other plants; how unlike it is to the well-known "greyback" cockchafer of our forest lands, which is equally at home whether tunnelling in the damp soils or flying around its various feeding-trees.

Some people would have us believe that the age of miracles is past, although, on the other hand, it has been stated by Lord Avebury that "our very existence is a miracle in itself." Certainly, to the true scientist or lover of nature, the life-cycle changes and complex metamorphosis of the cockchafer in question—one species only out of considerably over ten thousand beetles recorded from Australia—appear truly miraculous; while economic investigation regarding its habits and œcology during the larval and adult stages of development, coupled with such problems as its inter-relations with other insects, biological control, and a study of the various artificial remedial measures likely to prove effective against this serious cane pest, open up an almost inexhaustable field for scientific inquiry.

In America, owing to the number of economic entomologists available, it has been possible to estimate approximately the extent of financial losses due to the ravages of primary insect pests. It is thought that about 10 per cent. of every crop is probably destroyed by insects. "It would be within the statistical truth," says Folsam, "to say that it costs American farmers more to feed their insect foes than it does to maintain the whole system of education for everybody's children"; while the annual loss occasioned by insects amounts to nearly twice as much as it costs to maintain the American army and navy.

Such a statement should make Australians realise the supreme importance of enforcing strict quarantine supervision, with a view to preventing as far as possible the disastrous introduction into this country of certain notoriously destructive insects.

Regarding the economic status of our "greyback" cockchafer, I may state that, unlike several closely-related scarabæidæ occurring in other countries (genera *Lachnosterna* and *Melolontha*) which have a life cycle of from two to three years, the life of our Queensland species *Lepidoderma albohirtum* Waterh., from egg to adult beetle, is completed in twelve months.

It is probably due to this fact, coupled with the large size and voracity of its grubs, that we must attribute those capabilities for destruction which during seasons of normal rainfall have enabled this insect to take first place as a pest of cane. The importance of systematic action, however, when attempting to combat such insidious foes as the larvæ of cockchafer beetles has not yet been fully realised by our farmers; many of whom, who would not dream of neglecting to manure their crops at the right time, still continue to postpone treatment for cane grubs until signs of injury are apparent, and it has become too late to remedy the evil.

### Emergence of Cane Beetles in the Cairns District.

Since reporting last month that "greybacks" had appeared on the wing about 14th November, a very decided emergence of this cane pest has occurred; beetles having been much in evidence around Meringa, Kamma, Gordonvale, Highleigh, &c., where the numbers of beetles on feeding-trees have exceeded previous emergences noticed during the last few seasons. At the present time (11th December) plenty of specimens are still on the wing, although egg-laying has been proceeding since about the 3rd December.

### Proportion of Sexes during Aerial Existence.

Data obtained by collecting several hundred specimens from food-plants growing close to the Experiment Station showed that on 19th November (about a week after emergence of these beetles) 60 per cent. of those captured proved to be of the female sex; while out of a collection of 323 beetles made the following day (20th November) 198 were females. Nineteen days later (3rd to 10th December) an additional 400 "greybacks" yielded a percentage of 43 females, indicating that the period of oviposition was in progress.

### Beetles Attracted to Electric Light.

On 29th November, a beetle-trap designed a few years ago by the writer, was fitted with an electric lamp of 32-candle power in order to see if such form of illumination would prove as attractive to these insects as acetylene light.

This trap was placed close to a "Weeping Fig" tree (*Ficus Benjamini*), on which a number of "greybacks" were feeding. In less than two hours eighty beetles were captured, forty-one of which proved to be females.

It was found by experiment that setting the lamp in a concave reflector of about 8 inches diameter did not, apparently, make the light more attractive.

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## FIELD REPORTS.

*The Northern Field Officer, Mr. A. P. Gibson, reports on the Mossman cane areas, inspected from 7th to 20th November, as follows:—*

### MOSSMAN.

**Rainfall.**

| | |
|---|---|
| January | 8.65 |
| February | 37.14 |
| March | 14.84 |
| April | 2.91 |
| May | 1.25 |
| June | 0.40 |
| July | 1.07 |
| August | 0.34 |
| September | 0.14 |
| October | 0.51 |
| November | 11.21 (to 20th) |

It will be seen that the fall to date has been badly distributed. Available past annual rainfall sheets showed that the November fall was the greatest for many years.

### 1928 Crop, its Harvesting and Milling.

The season commenced on 12th July and finished on the 1st November. Though the area cut was less, the tonnage harvested per acre was greater than that of the previous year. The crop in quantity and quality was short and sweet. Prolonged dry weather fully ripened the crop and enabled harvesting and milling operations to proceed uninterruptedly. However, it stayed the crop growth, and aided the pests, and brought about diminished yields and increased harvesting costs. Practically the whole crop was fired prior to its harvesting. As the cane was erect more per man per day was cut, therefore the factory was fully supplied all the time. All past milling records, such as crop sweetness, tons milled per week, tons sugar manufactured per week and season, were eclipsed. The crop was estimated at 80,000 tons; 78,542 tons were milled, yielding approximately 11,700 tons of sugar. The mill average c.c.s. was remarkably high, being 15.53 per cent. The major varieties milled were H.Q. 426 and Badila. The mill could comfortably crush another 20,000 tons, and it would not be impossible to make up the deficiency on the sugar lands at present growing cane by better farming, drainage, and judicious fertilising.

### The New Crop.

Timely rain has improved wonderfully the 1929 crop prospects. The early planted cane had germinated favourably. Farming methods, though good in some instances, are not what they might be. The fruits of good and timely tilling may easily be detected. Some fields had not been touched since harvesting, small wonder poor crops are cut.

*Planting.*—Planting was under way. The soil had not been too well prepared. The seed used for the greater part was poor. Lack of rain at the end of the season compelled most farmers to harvest all cuttable cane, hence the difficulty in procuring seed. Not a few farmers filled the plant cane gaps by transplanting cane stools. It should always be seen that these are disease-free. Transplanting may be successfully accomplished during a wet sunless period.

*Manuring.*—Different manures, different rates, and different application methods were noted. It is not feasible that the popular mixtures used are suitable for all our different canes and soils throughout Queensland's sugar-growing belt. Fertilisers are not always applied as early as they should be. It should be remembered that cane growth once lost cannot be recovered, therefore it is desirable to fertilise early so as to force the early growth along. By so doing the interspaces are covered in a quicker time, evaporation is checked, and weeds suppressed; also the cost of production is reduced.

**Pests and Diseases.**

Heavy nightly flights of beetles, commencing about 7 p.m., were noted. Numerous emergence or descending holes were found in most fields. Wireworms were damaging primary plant cane shoots. Army caterpillars were noted devouring the cane foliage in isolated parts. Rats were eating newly forming cane, also the perished stems lying about the fields, suggesting they are hungry and that now is the right time for poisoning. Heaps of cane cut to seed prior to the rain, and covered with trash, were damaged by this pest.

Diseases noted were Leaf Stripe, "Jump Up" or Downy Mildew, Leaf Scald, and Mosaic. Leaf Stripe, the major disease, though very bad in parts, is becoming less. Mosaic was found in the variety B. 156 growing at Saltwater.

**DAINTREE.**

A brief inspection of the Daintree was made; the natural beauty of the river would be hard to surpass. The river banks are scrub covered, the land slopes back in places to great swamps. What could be seen of the soil was good. It is said there are 4,500 acres of good land blessed by a 100-inch rainfall. Already there is a butter factory at work on the upper reaches, and surrounding it is dairying land equal to the very best in Queensland.

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## QUEENSLAND FRUIT IN SYDNEY.

This interesting news item is taken from the Sydney "Evening News" (7th December, 1928):—

Fine specimens of tropical fruits were shown to the Housewives' Association at the Lyceum Club yesterday by Mr. P. J. Nally, of the Queensland Tourist Bureau.

Exhibiting a large pineapple, he said he had purchased it in King street for 4s., whereas in the Sydney fruit markets the same fruit could be purchased for 17s. a case. Mangoes, which were sold in Sydney for 1s. 6d. each, were sold in Queensland at £1 a case of nine dozen, and the prolific papaws, sold in our city for 4s. each, were fed to fowls.

The papaw, he said, could be utilised for making ointment, paint, chutney, as vegetable marrow, and as dessert. In addition to this, the wrapping of the leaf round tough steak would cause the meat to become deliciously tender.

To bring Queensland fruits within reach of Sydney people, many of whom did not know the flavour of the tropical products, Mr. Nally said that he hoped to establish a stall in the city.

He suggested that if the Housewives' Association bought sugar in bulk, say in ½-ton lots, it could be retailed to members, who would effect a saving thereby.

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*THE SPIRIT OF CHRISTMAS.*

*From the Queensland Cane Growers' Council to the Editor:—*

*"The spirit of Christmas calls to a better appreciation of the value of old friendships.*

*"We consider ourselves fortunate in being among those to wish you a Christmas of joy and contentment and an exceptionally happy New Year."*

# INSECT ANATOMY.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

The body of an insect consists of three very distinct regions each of which is composed of a number of segments. These three regions are the head, the thorax, and the abdomen, each of which can be clearly distinguished in such a common insect as the Queensland fruit fly or the ordinary house fly. The main anatomical features and functions of these various regions will now be dealt with in some detail.

The antennæ, the eyes, and the mouth parts are the most conspicuous features on the insect head. They all perform highly important functions in insect life, and, although impressions can be received by the insect through the agency of organs situated on different parts of the body, the impressions that are received by the organs situated on the head include the extremely important ones of sight, smell, touch, taste, and hearing.

## The Antennæ.

The antennæ are a pair of very conspicuous jointed appendages which are situated on the head either between or in front of the compound eyes. The shape and size of these antennæ vary tremendously in the different families of insects, but although these variations are of great scientific importance their discussion is unnecessary in these notes. It may be mentioned, however, that not only do striking differences occur in the structure of the antennæ of different insects, but they may also be found in the two sexes of the same species—e.g., in mosquitoes the antennæ are very plumose or feathered in the male, whereas in the female they are pilose or clothed with down.

## Sense of Smell.

It is generally agreed that the olfactory sense or sense of smell is located mainly but not necessarily exclusively in the antennæ. Definite evidence exists to show that in certain insects the sense of smell is wholly restricted to the antennæ, and if these organs are removed the insects lose the olfactory sense. It must be pointed out, however, that in some other insects the removal of the antennæ does not appear to be accompanied by the loss of the sense of smell, a fact that seems to indicate that the olfactory sense in these particular species is not restricted to the antennæ. Nevertheless it is probably correct to say that the sense of smell in the majority of insects is mainly if not wholly restricted to the antennæ.

The olfactory sense may perform several functions; it may enable an insect to find a suitable medium in which to place its eggs or maggots as in the case of the blowflies. In these the sense of smell is extremely acute, and has been admirably developed for the purpose of enabling the flies to locate their maggots food supply. A second function of the sense of smell is illustrated by the fact that it has been demonstrated that in certain moths the males find the females only by virtue of the olfactory sense possessed by the antennæ; when these organs are removed the males are no longer able to find the females for mating purposes. Thirdly, there is the relationship that exists between the sense of smell and the choice of food plants by female insects for the purpose of egg-laying or oviposition.

### Perception of Sound.

The antennæ may also function for the perception of sound, a fact that is well illustrated in the case of mosquitoes. The antennæ of the male mosquito are very plumose, as a result of an extremely pronounced development of antennal hairs, and it has been experimentally demonstrated that these hairs may be set in vibration when certain tones are produced. It is argued that in this manner the male is able to locate the buzzing sound produced by the female and so can fly to it for mating.

It must not be assumed, however, that the sense of hearing in insects is confined to the antennæ. On the contrary, auditory organs are also known to occur on other portions of the body, including the legs and abdomen.

### Sense of Touch.

The sense of touch is also well developed in the insect world, and, as in the case of the auditory organs, it is by no means confined to one region of the body, although it is believed to be particularly well developed in certain portions, included amongst which are the antennæ. Apart from those areas in which the tactile sense is exceptionally well developed, practically any other part of the surface of the body possesses the sense of touch.

### The Eyes.

The eyes in the insect world are of two distinct types—firstly, there are the large compound or faceted eyes; and secondly there are the smaller simple eyes or ocelli. The compound eyes are clearly seen on each side of the head in such an insect as the Queensland fruit fly. An examination of these compound eyes by means of a hand lens will show that superficially they consist of an enormous number of very small areas or facets.

The number of facets in the compound eye is generally very large, being 4,000 in the case of the common house fly, as many as 25,000 in certain moths, while 28,000 have been recorded in some species of dragon flies. Exceptionally, there may be only a few facets, six to nine having been recorded in the worker caste of one species of ant.

The simple eyes are frequently absent in the adult insects, and in rare cases even the compound eyes may be missing. The simple eyes are generally the only organs of sight in immature forms of insects possessing a complete metamorphosis, such as caterpillars, but in internal parasites, such as small wasp larvæ, even these simple organs of vision are absent.

The discussion of insect eyes would be incomplete without a reference to the fact that frequently marked sexual differences occur in the eyes—e.g., in most flies the compound eyes in the male are appreciably larger than in the female.

### Power of Vision.

With respect to the power of vision possessed by the two types of eyes just discussed, it is generally believed that through its compound eyes the insect is able to detect movements made by other animals or objects and also to recognise form. The power to detect movement probably extends to some considerable distance, but the perception of form is thought to be restricted to a few feet, probably six or seven. It is further believed that the simple eyes enable the insect to distinguish the form of objects in a crude manner, but such power is restricted to objects very close at hand. The simple eyes further enable the insect to distinguish light from darkness.

### The Mouth Parts.

The mouth parts of many insects have undergone very profound modifications, and a number of distinct types of mouth may be observed even in the course of a very casual examination of some of the commoner insects. These varying types of mouth parts belong to the four following classes:—

(1) Biting and chewing mouths.
(2) Piercing and sucking mouths.
(3) Biting and sucking mouths.
(4) Sucking mouths.

Each of these types of mouth parts is worthy of some discussion.

### Biting and Chewing Mouth.

The biting and chewing type of mouth is well represented by the grasshoppers and beetles. These insects feed by biting off and swallowing the tissue of the plants on which they live. The mouth parts have been modified to permit of this type of feeding, and the damage caused by these insects when attacking foliage or other tissue is usually very obvious.

### Piercing and Sucking Mouth.

The piercing and sucking type of mouth is that possessed by scale insects, orange bugs, mosquitoes, and many other species of outstanding importance. In these insects the mouth has been so modified that certain parts thereof known as stylets function for the piercing of the skin, cuticle, or epidermis. Through the wound thus made the insect sucks out the blood or sap of its host animal or plant. The results of attacks by insects belonging to this class are not generally quite so obvious as in the case of those possessing biting and chewing mouth parts. Most people are aware, however, of the painful impression left by the attacks of sandflies and mosquitoes, and they also very frequently see leaves or young twigs of trees that have curled up and withered as a result of the attacks of aphids or plant lice. When plants are severely attacked by these insects the drain on their sap is frequently tremendous, and the plants are consequently stunted and sickly; in fact they not infrequently succumb to the attack in cases where the insects feeding on them are abnormally abundant. The importance of insects possessing this type of mouth is further demonstrated by reference to the fact that mosquitoes are responsible for the transmission of several very serious diseases of human beings.

### Biting and Sucking Mouth.

The biting and sucking type of mouth is one that is found in the Hymenoptera, the Order to which the bees and wasps belong. In this type the mandibles and jaws are well developed for biting, but at the same time other parts of the mouth are so modified that the insect is also able to suck up liquid food. Insects belonging to the other three classes possess mouth parts that can either bite or suck, but this is the only class in which both these modes of feeding can be adopted.

### Sucking Mouth.

The last type of mouth part to which reference has to be made is that of the sucking type possessed by butterflies and moths. The mandibles in most of the moths and butterflies are absent, and other parts

of the mouth have been modified so as to produce a long sucking tube through which liquids can be sucked up. Insects possessing this type of mouth are generally quite incapable of destroying plant tissue, i.e., when they are adults; of course, moths in their immature forms as caterpillars possess a totally different type of mouth and they are, in that stage of their life history, able to cause very serious losses. It has been said that moths are incapable of injuring plant tissue, and that statement in general is quite sound. There are, however, some exceptions, including the orange-piercing moths, which are quite important citrus pests.

## The Thorax.

The thorax is the second or middle region of the insect body. It consists of three segments and typically bears two pairs of wings and three pairs of segmented legs in the adult stage. The second pair of wings in the flies, however, is represented by two small knobs known as halteres or balancers. Further exceptions occur in some families in which both pairs of wings are missing or rudimentary, sometimes in both and sometimes in one sex only. In other abnormal cases the wings may be restricted to a single pair in one sex only.

## The Wings.

The first pair of wings is always situated on the middle segment of the thorax, the second pair being on the hind segment. When an insect possesses only a single pair of wings it is almost invariably the second pair that is absent. It has also been demonstrated that in some wingless insects (such as the flea) the wings have degenerated through lack of use, but in certain very primitive insects no trace of wings can be found even in the embryo.

The wings in many species such as the bees, wasps, dragon-flies, and flies are generally quite clear and membraneous. This is, however, by no means always so, for in the grasshoppers and their allies the front wings are distinctly leathery while in the beetles they are typically hard and horny. Again, in the moths and butterflies both pairs of wings are generally densely clad with scales which frequently give rise to extremely beautiful wing patterns. It is thus evident that the wings of insects are subject to very great variation.

Very powerful muscles, whose function it is to operate the wings, are situated within the external skeleton of the thorax. These may drive the flight organs at the rate of 330 strokes per second, as is the case with the house fly, or on the other hand they may produce the much slower rate of vibration that is typical of many common butterflies, only nine strokes per second having been recorded in certain species.

## The Legs.

The insect leg consists typically of five segments, the last of which is itself usually composed of five parts of varying size. This terminal segment of the leg usually bears two claws and is also frequently furnished with a pulvillus or pad. The pad is typically adhesive and is generally held to be responsible for the power that flies and other insects possess of being able to walk on ceilings and on the undersides of leaves, &c., in an inverted position.

Legs occur in the great majority of adult insects, but in their immature stages legs are by no means invariably present—e.g., many beetle larvæ and most hymenopterous larvæ are legless, and the legless condition is the rule in the larvæ of flies.

The legs function primarily for walking or running but they are frequently modified for other purposes—e.g., in certain species the fore legs have been so altered in structure as to be suitable for burrowing, while in some species they have been adapted for seizing other insects. The hind legs in certain species have been abnormally developed so as to permit of jumping or leaping for considerable distances.

### The Abdomen.

The abdomen, which constitutes the third region of the body, consists of a series of segments that exhibit comparatively little variation. Perhaps the most conspicuous external features of the abdomen are those associated with reproduction, for in the females of many species an ovipositor or egg-laying tube is distinctly visible.

### Respiration.

Respiration in the insect world takes place through a system of air tubes or tracheæ, which ramify throughout the whole of the body, and in this way carry oxygen to the various tissues and organs. The openings in the body wall which permit of air entering the tracheæ are known as spiracles or stigmata. These occur in pairs on the thorax and abdomen and are generally situated laterally. Special provision for respiration is made in the case of the larvæ of aquatic insects, the special organs developed to meet the unusual conditions being known as gills.

### Reproduction.

The normal procedure of sexual intercourse is generally necessary for reproduction in insects, and the sexual act is typically followed by the laying of fertilised eggs. To this generalisation there are, however, quite a number of exceptions, for many insects are viviparous—i.e., the females do not lay eggs but give birth to living larvæ or nymphs. The eggs are produced within the body of the female, but they are retained therein until the incubation period has been completed; the maggots or nymphs that have hatched are then extruded by the female. Many aphids and scale insects are viviparous as also are many species of flies.

A further point worthy of note in connection with insect reproduction is the fact that occasionally reproduction can take place without sexual intercourse. This phenomenon is known as parthenogenesis.

*NO FARM HOMESTEAD COMPLETE WITHOUT THE JOURNAL.*

*A Gatton farmer, in renewing his Journal registration for another term, writes* (17-12-28):—

*"No farm is complete without its chooks, and no farmer's homestead is complete without the Journal."*

# SUGAR-CANE GROWING IN QUEENSLAND.

Sugar-cane is grown in Queensland on a long but fairly narrow coastal strip, extending over 1,000 miles in length, lying between latitudes 15 and 28 south. Parts of this belt are separated from each other by tracts of non-sugar country, and the latter, due to deficient rainfall or poorness of soil, are not utilised for cane. The bulk of the staple is grown within the tropics.

It is the State's largest agricultural industry, the total area under cane approaching 300,000 acres, the number of farmers engaged in it being 7,300. It gives employment to 28,000 men, and the wages paid amount to £6,000,000 per annum. It probably pays the highest wages of any agricultural industry in the world, and is the only cane-sugar producing country which carries on the growing and manufacturing of sugar by white labour. Directly and indirectly, the industry employs some 100,000 persons.

**The growing of sugar-cane is essentially a small farmer's industry.**

The number of raw-sugar mills in Queensland at the present time is 35, the latest addition being the fine Government sugar factory in the Tully River district, North Queensland. The erection of this mill has caused a large settlement to come into being, with schools, banks, stores, picture shows, &c., where only six years ago a dense tropical scrub existed. The cost of a new sugar-mill such as the Tully was between half and three-quarters of a million pounds—that is, to erect and equip with tramlines. There are also two refineries—one at Bundaberg and one at Brisbane.

**The large towns of Cairns, Innisfail, Ingham, Ayr, Mackay, and Bundaberg are almost entirely supported by the Queensland sugar industry, and many other thriving townships are absolutely dependent upon it.**

The State Government, naturally, takes a very keen interest in this great industry, and the price paid for sugar is the outcome of negotiations by the State with the Australian Federal Government. In order to protect farmers, the Sugar Cane Prices Acts were passed, and the grower has a voice in the fixing of the price for his product. Another result of the care given by the Government to the industry is the great reduction (nearly 2 tons) in the average weight of cane required

to make 1 ton of sugar. This is largely due to the introduction of better varieties of cane, more careful cultivation, better mill work, and organised instruction.

This article is intended to help growers in securing greater efficiency in the cultivation of cane, and so to reduce their costs of production; also to be of assistance to intending sugar-growers who desire to purchase cane farms.

**The sugar industry has increased the population of North Queensland by over 30 per cent. in recent years.**

There are many persons in Queensland who have purchased cane farms without any great knowledge of canegrowing, while many others frequently apply to the Department of Agriculture for information on the subject. The main points upon which information is sought are in relation to what might be termed the economics of the cane farm: What amount of capital is required to buy a farm? What working plant is needed? And what will be the return per acre?

In the present condition of the sugar industry it has, first of all, to be recognised that no Crown land is at present available for sugar-growing, so a would-be cane farmer must purchase a farm which has an assignment to an existing mill, or else lease such a farm.

It may be pointed out that the average size of a cane farm in Queensland is 36 acres, the largest farms being in North Queensland. The following table shows the average size of farms from Cairns to the Logan River district:—

| | |
|---|---|
| Cairns to Townsville .. .. .. .. | 48 acres. |
| Townsville to Mackay .. .. .. | 43 acres. |
| Bundaberg, Childers, Maryborough, &c. .. | 27 acres. |
| Maroochy to Logan .. .. .. .. | 9 acres. |

It will, therefore, be seen that the smaller farms are in the southern part of the State, where many canegrowers take up the growing of other crops or go in for dairying as a side line. In North Queensland canegrowing is the sole occupation of the cane farmer, and the high price of property in the belt of land from Ingham to Cairns compels his whole attention to making a living from cane alone.

The greater part of the farms in the Tully, South Johnstone, Babinda, and Innisfail cane areas were originally under scrub which was of a heavy nature.

In North Queensland, the buyer, when purchasing farms which have been developed from scrub lands, should select those with a good depth of soil. Light red soils on ridges should not be taken in preference to

PLATE 3.—CANE FARMER'S HOMESTEAD AND CROP NEAR REDLYNCH, CAIRNS RAILWAY.

dark chocolate soils of level formation. The high cost of clearing these dense scrubs renders the price per acre of land under cane much higher than forest soils.

Southern scrub timbers are lighter in character than the northern ones. The nature of the soil on the farm and its depth and colour should be carefully ascertained before purchase.

As a general rule, the rich red volcanic soils that have carried scrubs, such as the Woongarra sub-district of Bundaberg, and the famed Isis (Childers) scrubs, are the best cane lands in southern Queensland.

Farms on forest lands are generally cheaper in price. The best of these soils for sugar-cane in North Queensland originally carried Moreton Bay ash (or Blackbutt, as it is sometimes called), acacia, and cocky apple. Other forest country had ironbark, bloodwood, poplar gum, cabbage gum, blue gum, tea-tree, wattle, &c. Southern forest lands grow a good many of these trees, though not much poplar gum. Country covered entirely with poplar gum is usually shallow, with a stiff clay subsoil, and should be avoided for canegrowing.

It may happen that improved farms offered for sale have a portion still under scrub or forest, and the cost of clearing and planting such an area when required for cane has to be taken into account. The following gives the approximate cost of this work on northern scrub soils according to location, kind of scrub, and nature of burning:—

Brushing, felling, burning, logging, and reburning—£12 to £17 per acre.
Holing for cane plants—3s. 9d. to 4s. 6d. per hundred.
Plants—£3 to £4 15s. per acre.
Labour-planting—£3 to £4 15s. per acre.
Chipping—£5 to £12 per acre.

In many of the Northern scrubs, the cost of felling, lumping, burning, holing, making roads, planting, and fencing have been given from £33 to £50 per acre. Grubbing and stumping have been taken to cost from £8 to £25 per acre, according to the timber.

In the Southern districts the cost of planting cane on the lighter scrubs would be much smaller, and has been set out as under:—

| | Per acre. £ s. d. |
|---|---|
| Brushing, felling, clearing, lumping, and burning .. | 3 10 0 |
| Holing .. .. .. .. .. .. .. | 2 10 0 |
| Plants .. .. .. .. .. .. .. | 2 10 0 |
| Planting .. .. .. .. .. .. .. | 2 0 0 |
| Chipping three times .. .. .. .. .. | 4 10 0 |
| | £15 0 0 |

Scrub lands, after carrying from three to five or more crops, are then usually stumped and put under the plough.

Forest lands are nearly always completely cleared—i.e., they are at once stumped and put under the plough. The cost of clearing forest land varies a good deal, and may run into as much as £17 per acre in North Queensland and from £5 to £10 per acre in Southern Queensland. The cost of breaking up, further cross ploughings, and planting of cane would be additional.

**The sugar industry employs 21,000 men in the cane fields and 7,000 in mills and refineries.**

## Purchasing Improved Farms.

When setting out to purchase an improved cane farm, the intending buyer should make detailed inquiries as to the value he is going to get for his money. The officers of the Bureau of Sugar Experiment Stations, attached to the Department of Agriculture and Stock, are at all times ready to give information and advice on the matter. The managers of the sugar mills to whom the farmers supply cane will always be found willing also to give information and advice. Always see that the cane land is properly assigned to a sugar mill, that the cane crop and improvements are worth what is being asked, and examine the soil and surroundings carefully, the latter particularly with reference to economic transport to the sugar mill.

The price of land varies considerably according to the location of the farm, from about £20 to £130 per acre. The lower priced farms are situate in Southern Queensland, where the yield per acre is usually not so high, and where the crops take longer to grow. The high-priced farms are mostly in North Queensland, where the returns are regular and droughts are practically unknown. These lands are all improved, and the improvements consist of the cane crop, team of horses, necessary implements, residence, and stables. The climate in North Queensland is a good one. The mills are modern and efficient, and are amply provided with tramlines and locomotives for carrying in the crops. The adjacent townships are provided with post and telegraph offices, schools, medical men, hospitals, &c.

**Queensland is the only country growing sugar-cane by white labour. The sugar industry is the mainstay of the White Australia policy.**

The more capital a man has the better chance he possesses of doing well rapidly. The smallest amount of capital a man would require would be £500 to pay a deposit and carry on, but if he were buying a cane farm about Innisfail, Babinda, or Cairns £2,000 would be much better to enable him to pay a fair amount of deposit and have some capital to carry on until his crop came in.

The following could be stated as the basic equipment for a small improved cane farm, apart from the cane crop:—

Buildings.—Residence, implement shed, stables, and chaff-cutting shed.

Implements.—Single disc plough, 28-inch, 3-horse swing plough, light 10-inch ratooning plough, Planet Junior scuffler, disc harrow, tine harrow, and roller.

Power.—A 3½-h.p. oil engine, chaffcutter, and sawbench.

Stock.—Three good draught horses or tractor and saddle hack. Two dairy cows are also desirable.

Miscellaneous.—Sulky or car, oils, benzine.

Tools.—Hoes, spade, shovel, pick, axe, files, cane knives, and set of carpenter's tools.

Equipment would vary according to the size of the farm purchased.

In addition to the cost of the farm with its improvements, the purchaser must be prepared for rates, taxes, interest, depreciation in buildings, implements, and stock, levies, assessments, wages, repairs, fuel, &c.

## Cultivation of Cane.

The foregoing remarks are intended for new growers who wish to enter the industry; the following are for the benefit of canegrowers already in sugar-growing as well as for those commencing, and apply to land under the plough, as the greater part of the cane lands in Queensland come under this category, especially in the older areas which have been growing cane for many years. In the following districts either the whole or the greater part of the canegrowing lands are under the plough:—Logan, Maryborough, Isis, Bundaberg, Mackay, Proserpine, Lower Burdekin, Herbert River, Innisfail, Mulgrave, Hambledon, and Mossman.

For the purpose of ploughing out stools, a disc plough, either double or single, is generally used, and the discs should be particularly sharp so as to cut up the stools as much as possible. A few farmers make a practice of carting away the old stools, and if the time and labour can be afforded it is often wise to do this, as it gets rid of any disease and borer. It is, however, recognised that there are many difficulties in the way of carrying this out, and, if it is not practicable, the stools should be cut up so as to secure their quicker disintegration.

## Liming.

Some cane lands require lime. This can generally be ascertained from an analysis of the soil, which is carried out free of charge to sugar-growers by the Department of Agriculture and Stock through the Sugar Bureau. As a general rule, lime is required in most of the areas above

(Battle Frere Mount.)

PLATE 4.—FROM FIELD TO MILL.—LOADING CANE TRUCKS ON DR. KNOWLES'S FARM, NEAR BABINDA, NORTH QUEENSLAND.

Townsville, while below it the application of lime has not been found particularly payable.

Lime is usually applied to the soil in the following forms:—

(*a*) Burnt lime or lime oxide.

(*b*) Air-slaked lime—i.e., burnt lime that has been allowed to gradually slake in the air, and which ultimately becomes lime carbonate.

(*c*) Water-slaked lime (lime hydrate).

(*d*) Pulverised limestone (lime carbonate).

Burnt lime is the most valuable form for sweetening soils and producing alkalinity, especially on our Northern canefields, where the rainfall is great and the humus plentiful. It is, however, hard to obtain in a fine condition, and is disagreeable to handle. By air-slaking, however, it soon crumbles into a fine powder, which gradually turns into lime carbonate—a milder form of lime. This can be easily applied, and is recommended where a quick action is desired.

Ground or pulverised limestone is also very useful, but its action is comparatively slower.

### The Relative Value of Different Forms of Lime.

Fifty-six pounds of fresh burnt lime contain the same amount of lime as 100 lb. of carbonate of lime (ground or pulverised limestone), 100 lb. of old air-slaked lime, or 74 lb. of water-slaked lime. One hundred tons of burnt lime have the equivalent value of 178½ tons of pulverised limestone or carbonate of lime.

The pulverised limestone is much more agreeable to handle than burnt lime, even when the latter is air-slaked; but in considering cost it has to be remembered that in value 1 ton of burnt lime is equal to approximately 1¾ tons of ground limestone, and will slake to that amount.

The Railway Department, at the request of the Bureau of Sugar Experiment Stations, now carries lime at ½d. per ton per mile when the distance exceeds 25 miles.

Lime should be spread broadcast with shovels, selecting the early morning for the purpose, when there is little or no wind, and it should be immediately ploughed under. This ploughing should be shallow, as the lime will naturally work through the soil. It is sometimes preferred to harrow the lime in, reserving the ploughing till a few weeks later.

Machines are made to distribute lime, and an implement of this nature can be very well used with pulverised limestone and slaked lime.

### Necessity of Restoring Humus to Soils.

One of the best methods in preparing land for cane crops is the growth of a green manure crop and its subsequent ploughing under. This

is not only a form of rotation, which in itself is highly beneficial, but it is a means of restoring humus to our old cane lands, and is a prime essential in the making of a fertile soil. Humus benefits the soil physically—

1. By augmenting its water-holding capacity.
2. By increasing its warmth.
3. By bettering its texture and being a controlling factor in the determination of fine earth.

**The defence of this continent and the maintenance of White Australia are involved in the preservation and advancement of the sugar industry.**

Humus in the soil is lowered by—

1. The continued growth of crops.
2. Bare fallowing.
3. The continued use of artificial fertilisers.

The best possible crops to grow for green manuring purposes are the legumes, such as cowpea, Mauritius bean, velvet and soya beans, lupins, vetches, &c., and it is strongly recommended that an excellent method for restoring fertility to the soil is the growth of a leguminous crop of some kind for the purpose of ploughing under.

Generally speaking, it takes from six to eight weeks for the crop to rot down. When this has taken place, if the time is convenient, the ground can be got ready for the succeeding cane crop.

## Drainage.

If the ground is inclined to become water-logged, or if subject to heavy tropical rains, it would be wise to drain the area to be put under cane. Tile draining is the best form to adopt; but this is usually costly, and good results may frequently be obtained from surface drainage, such as laying the land is beds, with a water furrow between so many rows of cane. These can be led to drains along the headlands if the lay of the land is suitable.

## Deep Ploughing and Subsoiling.

The tractor for ploughing purposes is now coming into extensive use, in North Queensland especially, and in many places good and inexpensive work is being done by its means. It is, however, of limited use on small areas, where horses are to be preferred. Nearly all the tractors in use pull from two to four discs and burn crude kerosene.

Land for canegrowing should be cross-ploughed deeply, not less than four times, and well worked up by harrowing, and, if necessary, rolling till it attains a fine state of tilth for planting. Every energy should be

bent towards securing the land in perfect heart, remembering that tilth should be secured prior to planting, not after it. With a good deep soil-bed in fine order the best results can be hoped for. In considering this phase of the question the matter of subsoiling naturally crops up.

The experience of the Mackay Sugar Experiment Station, and of many Queensland farmers who have tried it, is that subsoiling pays handsomely on alluvial soils. The method of subsoiling recommended is to open up a furrow with the swing plough to the depth of the soil usually ploughed, and then to use a subsoiler, which will loosen or stir the soil to the depth of another 6 inches below this, but which will not bring any of this lower soil to the top. At the Mackay Station the depth ploughed varies from 12 to 14 inches and the depth of the subsoil-stirring from 6 to 8 inches, thus forming a mass of fine, loose soil for the needs of the crop, while it is also a great help in the conservation of soil moisture. That the roots of the cane will take advantage of deep and subsoil cultivation is shown by the fact that roots have been found at 4 feet deep in loose soils.

**Good cultivation, careful choice of plants, and proper fertilising are the factors of success in canegrowing.**

Having got our soils in perfect tilth, as previously described, we must now turn our attention to the planting, upon which so much depends. The greatest supervision should now be exercised, so that only good, sound plants, free from disease, are selected. Even if it is necessary to pay a somewhat higher rate for good plants from outside, it is well worth while. Generally speaking, plant cane from 10 to 12 months old, or first ratoon of the same age, should be taken. If the time of planting corresponds to that of harvesting, it is a good plan to cut as many top plants as possible from the best of the cane going to the mill. These are undoubtedly superior to the parts of the cane situate lower in the stick, although butts make good plants. Top plants cannot always be procured, and it is then usual to cut up the whole stick for plants.

The best width of row has been found from numerous experiments in Louisiana, Hawaii, and Queensland to be 5 feet, though in the case of a straight-growing cane, such as D. 1135, this could be reduced to 4 feet 6 inches. The drilling is best accomplished by means of a double-mouldboard or drill plough. The plough should make a good wide drill about 9 to 10 inches deep in the loose soil. Where the cultivation has been deep and good, this will leave a few inches of soil for the plant to lie on. Some farmers believe in going very deep with the plough and cleaning everything out to the hard bottom, but our experience has been that better results are obtained where a certain amount of loose earth is left at the bottom of the furrow. Moreover, in a dry time, when planting by hand, there is usually a certain amount of moisture in this loose soil into which

the plants can be pushed down, and so give them a much better opportunity to strike more rapidly. Three-eye plants are almost universally favoured, but the distance at which the plants are to be spaced apart in the row varies greatly in the different districts. At Bundaberg the plants are often placed 12 to 18 inches apart, while on the Herbert River the planting is almost continuous. A good average distance for the spacing, and one we have found to give good results, is 6 to 9 inches. In North Queensland Badila can be planted 12 inches apart. The plants are usually put in about 9 inches deep when planting by hand and covered with from 2 to 4 inches of soil—2 inches when conditions are very moist and 4 inches when they are very dry. When planting by hand, the cane sets should be laid in the ground with the eyes at the sides if possible. The cane-planting machine, however, is now largely used, and, while spacing cannot be carried out so evenly by its means, it puts the plant well down into the moist soil. It is a great labour-saver, and many types of machine are now upon the market.

**Queensland requires to increase its yield of cane and sugar per acre. Only the best treatment of the soil will do this.**

As soon as the cane is up about 6 inches the subsequent shallow cultivation of the interspaces between the rows should take place; the drills may be cleaned and cultivated with what is known as the cane chipper or drill cleaner, or cultivating and weeding attachment. Failing one of these the drills must be chipped or weeded by hand with hoes.

Shallow cultivation of the interspaces after the crop is up not only destroys weeds but leaves a level mulch of soil on the surface, and so conserves the moisture. Every care should be taken not to cut the young roots of the cane which are commencing to form and reach out for plant foods and moisture. The cultivator should be run over the interspaces, if possible, every fortnight until the cane is high enough to lay by—i.e., if the cultivation between the cane pulls off green leaves it should be discontinued.

The method of cultivation of interspaces at the Sugar Experiment Stations is by using a Planet Junior cultivator fitted with broad sweeps or hoes. Good results have always followed this, and it is most necessary during dry periods.

While the use of a disc harrow may be permitted during the early stages of the crop, especially when some form of drill cleaner is pulled behind, its use should be prohibited directly it is found that the young cane roots (which subsequently begin to stretch out laterally) are being cut.

### Application of Manures.

When the young plant cane is about 18 inches high the application of fertilisers should be made, if considered necessary, to the plant crop. From a long experience of Queensland cane lands, it can be definitely affirmed that the manurial elements needed in the growing of successful cane crops are nitrogen, potash, and phosphoric acid. These are usually supplied in the following fertilisers:—

Nitrogen in—

Nitrate of soda contains about 15 per cent. nitrogen.
Sulphate of ammonia contains about 20 per cent. nitrogen.
Nitrate of lime contains about 12½ per cent. nitrogen.
Nitrolim contains about 18 per cent. nitrogen.
Dried blood contains about 11 per cent. nitrogen.
Meatworks manure contains about 3 to 7 per cent. nitrogen.

Potash in—

Sulphate of potash contains about 48 per cent. potash.
Muriate of potash contains about 50 per cent. potash.

Phosphoric acid in—

Superphosphate contains about 16 per cent. phosphoric acid.
Rock phosphate contains about 18 per cent. phosphoric acid.
Guano contains about 15 per cent phosphoric acid.
Thomas phosphate contains about 17 per cent. phosphoric acid.
Meatworks manure contains about 17 per cent. phosphoric acid.
Bonedust contains about 20 per cent. phosphoric acid.
Basic superphosphate contains about 19 per cent. phosphoric acid.

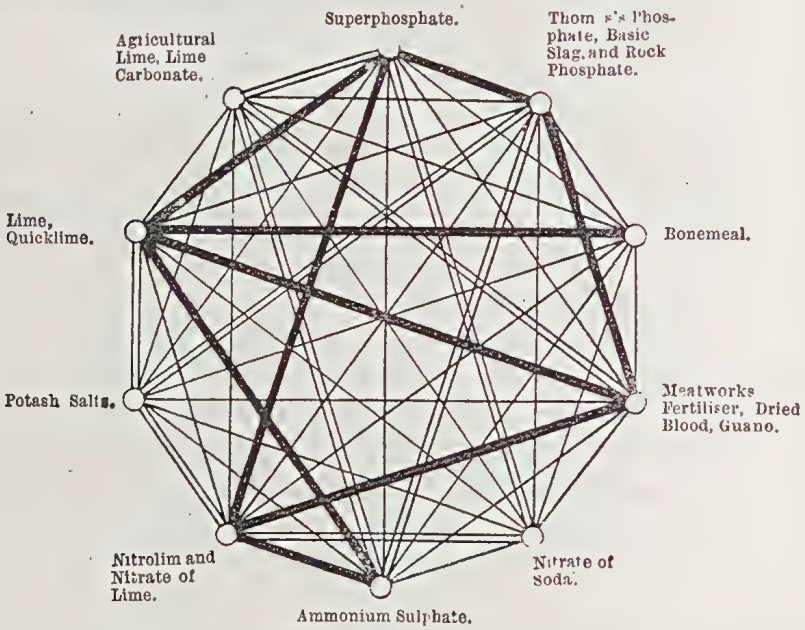
**Thorough cultivation means increased production per acre.**

Under the Fertilisers Act it is required that the dealer shall at the time of sale, or before delivery, give to the buyer an invoice certificate signed by the seller or his agent, stating the full name and place of business of the dealer; the name, trademark, brand, or sign used to mark packages containing such fertiliser and used to identify such fertiliser; the quantity or net weight of fertiliser comprised in the sale; the composition of the fertiliser, setting forth the proportion per centum in which such fertiliser contains the following ingredients:—Nitrogen, phosphoric acid, potash, and lime, and the forms in which they respectively occur; and, in the case of bonedust, basic slag, agricultural lime, &c., the percentage of coarse and fine material.

Furthermore, every dealer who sells fertiliser, which term includes offering or exposing for sale and having in possession for sale, shall

securely affix to each package a printed label, clearly and truly certifying:—The number of net pounds of fertiliser in the package; the figure, trademark, or sign under which the fertiliser is sold; the chemical composition of the fertiliser, in the same manner as stated on invoice certificate; and the state of fineness for certain fertilisers.

In mixing fertilisers care must be taken not to bring ingredients together which would lead to decomposition or loss of some part of the manure. Thus, should lime be mixed with sulphate of ammonia, a loss of nitrogen would take place. A simple guide for the mixing of manures is given in the accompanying diagram:—




All fertilisers joined by a *single line* can be safely mixed together and kept for any length of time. Fertilisers joined by a *heavy black line* should never be mixed together; those connected by a *double line* should only be mixed immediately or a short time before application.

Canegrowers can send samples of their soils to the Department of Agriculture for free analyses, and letters of advice as to the application of fertilisers by the Director of Experiment Stations will be sent out with the results.

The following is a typical mixture for sugar-cane, which could be varied according to requirements:—

250 lb. sulphate of ammonia per acre.

100 lb. sulphate or muriate of potash per acre.

250 lb. meatworks manure per acre.

Experiments in the field with fertilisers is a practice that can be highly recommended.

In applying nitrogen, if nitrate of soda is used, it should be remembered that it is easily leached from the soil; hence it should not be

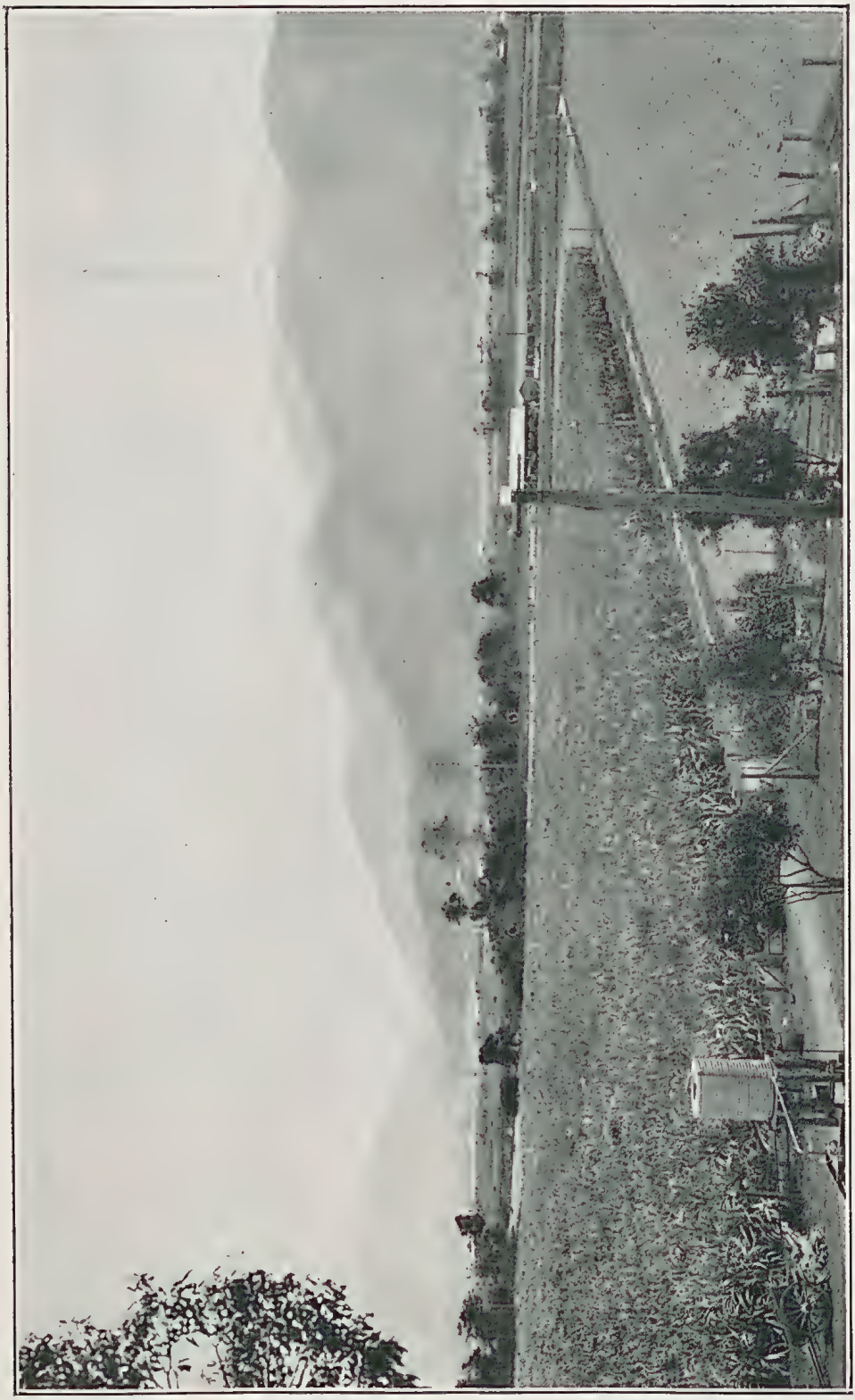


PLATE 5.

CANE FIELDS AT THE FOOT OF BARTLE FRERE, THE DOMINATING MOUNTAIN MASS OF THE COASTAL RANGE, BABINDA, NORTH QUEENSLAND.

From Bombaderie Farm.)

applied during a heavy wet season. It is a great plant stimulant, and has frequently been found to add such strength and vigour to cane plants that it strongly aids in obtaining other mineral food, such as potash and phosphoric acid, from the natural reserves in the soil. Nitrate of soda will often show its effects in a week or two, producing a rich, dark-green colour in the foliage, and cause a marked improvement in the growth of the cane.

Nitrogen, in the form of sulphate of ammonia, is not so quick in action as in nitrate of soda, while nitrogen in dried blood, bonedust, and meatworks manure is still slower in action, requiring chemical changes to convert it into nitrate so as to become available to the plant. Meatworks manure in the wetter cane areas of North Queensland is preferable to superphosphate as being less soluble.

It is not recommended that mixed fertilisers should be placed in the drill with the cane plants. As soon as the cane is about 18 inches high drills 4 to 5 inches deep should be drawn about 10 inches from the young cane on each side of the row, and the fertiliser is put into these drills and then covered, or a manure distributor can be used. Both sides of the row, however, should be treated. If nitrogenous fertilisers alone, such as nitrate of soda and sulphate of ammonia, are being used, they can be applied on the surface of the soil near the cane. Organic forms of nitrogen, such as meatworks and blood manures, requiring the action of soil organisms to render them available, should be placed in drills as above and covered.

For ratoons the manures can be applied while working the inter-spaces. They may be dropped in the furrow ploughed away from the cane and then covered.

On given soils, particularly on some of the red volcanic type, better results from the use of organic fertilisers, such as bonemeal, blood manure, meatworks manure, &c., have been realised. Megasse ash, molasses ash, farmyard manure, and filter press cake should all be availed of when they can be procured. The latter should be ploughed in some three or four months before the cane is planted, and the same may be said regarding the application of molasses when used as a manure.

**Restore the plant foods to the soil.**

Sugar-cane removes varying amounts of the vital elements from the soil. It is estimated, from analyses of the total cane plant (except roots) made in the Agricultural Laboratory, that the variety known as Clark's Seedling, sixteen months old, took from the soil 163 lb. of potash, 83 lb. of phosphoric acid, and 96 lb. of nitrogen, while the variety known as Badila, of the same age, took out of the land 139 lb. of potash, 44 lb. phosphoric acid, and 107 lb. of nitrogen per acre.

If the above instructions have been followed, the season favourable, and the land of fair average quality, a heavy crop of cane should result. This on old lands is usually easily harvested, as facilities in the way of tramlines are, as a rule, provided. The cost of cutting is governed by the Award of the Board of Trade. Farmers should be particular in having their cane cut to the ground level, or slightly below it, because if this is done the cane ratoons very much better. Unsightly stumps of cane sticking up above the soil for 3 or 4 inches or more should be strongly condemned.

When the cane is harvested it is necessary to turn to the ratooning of the cane—i.e., the second growth of a crop from the stools of the first or plant crop.

## Ratooning.

As soon as the cane is cut the farmer must make up his mind as to what he is to do with the trash, or dead leaves and tops, from the preceding crop. The tops whilst green are to a large extent used for forage purposes, so that, as a rule, there are not many of these left. The trash is usually burned in Queensland, but, if possible, after the last ratoon crop has been taken off it should be ploughed in to provide humus for succeeding crops of cane.

**Practise the best methods of ratooning. They will be found the most profitable.**

Ratoons should be well cultivated, and the following method can be recommended:—Immediately the trash is burnt off open up the middles of the rows to a depth of at least 9 inches with the swing plough. Next plough away from the cane rows on to the middles so that all the ground between the rows has been moved. Then run the tine harrows over all to level off. On alluvial soils all the rows should be subsoiled to a further depth of 6 inches after the swing plough is used. Subsequent cultivation with the Planet Junior fitted with broad hoes can then be carried out in the same manner as recommended for the plant crop. The results obtained at the Mackay Sugar Experiment Station for this method were as under:—

| Crop. | Yield of Cane per acre where the ground between the rows was ploughed and subsoiled. | Yield of Cane per acre where the ground between the rows was only ploughed to eight inches. |
|---|---|---|
| | English Tons. | English Tons. |
| First Ratoons .. .. .. .. .. | 38·9 | 27·0 |
| Second Ratoons .. .. .. .. .. | 31·3 | 19·2 |
| Third Ratoons .. .. .. .. .. | 20·4 | 9·91 |

These experiments were not fertilised.

By adding manures still larger results have been obtained. The usual methods practised by farmers, however, do not make use of the subsoiler. The following are favourite ways of ratooning:—

(*a*) Trash burnt and four furrows ploughed between cane rows. Land levelled down by use of tine harrows or cultivator.

(*b*) Trash burnt, procedure same as above, but only three furrows ploughed between rows.

(*c*) Trash burnt and ground cut up first with disc harrows crossways. Then use of plough between rows, followed by tine harrows crossways.

(*d*) Trash burnt, four furrows ploughed between rows, and skeleton plough used in furrows next to cane.

(*e*) Trash burnt and land treated with spring-tooth cultivator or a grubber instead of being ploughed.

(*f*) Trash left and rolled in each alternate interspace. Every other interspace well cultivated with the plough. In this way each row of cane has one side cultivated and one side uncultivated, but covered with trash.

(*g*) Trash left and cane allowed to volunteer without any cultivation at all. This method is sometimes advantageous in a droughty season, but is not to be recommended as a regular thing.

All these methods are in use, or some variation of them. In the writer's opinion the best cultivated ratoons (other things being equal) give the highest yields.

As a rule, considerably more benefit is got from the manuring of ratoons than from the manuring of plant cane, and this experience is common. This is strikingly shown in the following summary of experiments carried out at Mackay:—

| Plant Crop. | | | First Ratoon Crop. | | |
|---|---|---|---|---|---|
| Manures. | No Manures. | Difference. | Manures. | No Manures. | Difference. |
| 50·7 | 47·4 | 3·3 | 42·4 | 31·7 | 10·7 |
| **Second Ratoon Crop** | | | **Third Ratoon Crop.** | | |
| Manures. | No Manures. | Difference. | Manures. | No Manures. | Difference. |
| 38·8 | 24·1 | 14·7 | 35·9 | 19·8 | 16·1 |

The above are in terms of tons of cane per acre.

## Irrigation.

The climatic variations in Queensland from year to year are often so great that canegrowing is only certain in those districts possessing a

Plate 6.—From Field to Mill—Ready for the Road, Babinda, North Queensland.

high average rainfall. Districts with an average rainfall of 50 inches and under suffer exceedingly during dry spells, and irrigation would prove highly payable in such localities.

At the present time the only canegrowing district that uses irrigation water to any extent is the Lower Burdekin, situated some 40 to 50 miles south of Townsville. On the north side of the Burdekin River irrigation has been practised for a number of years, the plants used being the property of the farmers. Water is found at shallow depths, and is easily obtainable by sinking spearheads. On the south side of the river the Government have installed a complete system, available to growers of cane. Wells have been sunk and the pumps are electrically driven from a central power-house.

The cost of applying irrigation water on the Lower Burdekin is comparatively high, even though the most economical method is used, but the results usually pay extremely well.

## Efficiency in Sugar Growing.

Efficiency in the production of cane depends upon a number of factors, the principal of which could be summarised as follows:—

1. Each cane farmer should make a study of his soil, from both a physical and chemical standpoint. The analyses of cane soils are carried out free of charge by the Bureau of Sugar Experiment Stations, and a great deal of useful information can be learned in this way.

2. The equipment of a cane farm should be the best possible, and every attention should be given to the care of implements, preservation of harness, and the health and feeding of farm animals. Ploughs and other implements should not be left out in the weather, but be carefully greased and put under shelter as soon as finished with. The best and latest type of implements should, if possible, be procured, so that work may be done economically as well as efficiently.

**Make it your aim to be an efficient cane farmer and so make money.**

3. Labour of the best type should be selected, and the farmer should aim at making his permanent hands comfortable, at the same time giving them to understand that he expects a fair day's work for a fair day's pay.

4. Proper methods of keeping accounts should be adopted on the farm, so that the canegrower knows what he is about and what each operation is costing him. Nowadays a farmer has to be a sound business man to be efficient, as there are so many different phases requiring attention. He must be familiar with profit and loss, otherwise he will work in the dark.

5. Varieties of cane should be selected which are likely to give the highest results from a commercial cane-sugar point of view and yield of cane per acre.

6. In preparing for a plant crop, the soil should be thoroughly stirred by at least four ploughings, the depth of each being regulated by the depth of soil. In alluvial soils, such as river banks, subsoiling frequently gives excellent results in the shape of enhanced crops. Care should be taken that the soil presents a fine state of tilth just prior to planting.

7. The planting of cane should be very carefully supervised, and only good, sound plants free from disease should be used.

8. Fertilisers should be judiciously chosen, and care should be exercised in purchasing, so that the best and most concentrated fertilisers are procured. The farmer should see that he obtains the manure he orders, and should not buy more manure than he intends using. Bags of fertiliser should be prevented from getting wet. Advice as to fertilisers can always be obtained from the Bureau of Sugar Experiment Stations. Rotation should be practised, and green manure crops, such as Mauritius bean and cowpea, made use of for maintaining the nitrogen and humus contents in the soil.

9. It may be necessary on some soils to apply lime for the purpose of sweetening soils, rendering stiff soils more friable, and correcting mineral acidity.

10. The weeding should be carefully and efficiently done, and headlands should be kept clean so as to prevent rats and other pests that injure cane. The canefields themselves also should be kept as clean as possible, so that the plant foods in the soil go towards feeding the cane and not towards feeding weeds.

11. Farmers should endeavour to grow their own forage for stock purposes.

12. Vegetable and fruit growing on a small scale is useful for the dietary of the farmer and his employees, while one or two cows will also prove valuable in providing fresh milk and butter.

13. Every farmer should have a small area for experimental purposes, both for the growing of varieties and the testing out of fertilisers.

It may be objected that to carry out all the above will put too heavy a load on the small farmer, but these ideals could be kept in view and gradually put into practice. Many farmers, of course, have adopted most of these objectives towards efficiency and are successful accordingly.

**What should be aimed at is the securing of higher tonnages from smaller areas of land. It is only by adopting the very best methods that this can be done and the overhead charges be reduced per ton of cane.**

## Weather.

Hot, humid conditions are the best for the sugar-cane plant, and, fortunately, these generally obtain during the period of the maximum growth of the crop in Queensland. The wet season is usually synonymous with the three hot summer months of January, February, and March.

Although the weather is hot and humid during this period, the higher temperatures experienced in the dryer belts of Australia are not common. A temperature of 100 degrees is rarely recorded. It is unusual for the thermometer to show much above 90 degrees, even in the middle of summer. Indeed, during times of heavy rain, the weather becomes comparatively cool, but as soon as the sun reappears the atmosphere becomes steamy and the growth of the cane is vigorously promoted.

On the coast of Queensland, where sugar is grown, the greatest rainfalls occur where the mountain ranges come close into the coast. Where they are considerably distant, as at Bundaberg and Ayr, the lowest precipitations take place. Consequently the greatest amount of rain falls at Babinda and Innisfail, where the lofty ranges of Bartle Frere and Bellenden-Ker are not far from the seaboard.

## Rainfall.

The following table shows the average annual rainfall in each of the sugar districts:—

| District. | Average Annual Rainfall in Inches and Hundredths. | Districts. | Average Annual Rainfall in Inches and Hundredths. |
|---|---|---|---|
| Mossman | 82·91 | Proserpine | 76·96 |
| Cairns | 90·49 | Mackay | 68·52 |
| Mulgrave | 81·91 | Bundaberg | 44·40 |
| Babinda | 165·00 | Gin Gin | 37·71 |
| Innisfail | 149·20 | Childers | 42·07 |
| Ingham | 80·53 | Maryborough | 46·14 |
| Halifax | 89·17 | Pialba | 38·04 |
| Ayr | 44·48 | Nambour | 60·93 |
| Bowen | 40·60 | Beenleigh | 48·87 |

Exceptionally heavy rains occur occasionally, causing severe floods over the cane in low-lying areas. If the water subsides within two or three days little damage may be done, but should rain continue and the cane remain under water for a week or more, the crop is often lost.

## Humidity.

The mean relative humidity or percentage of moisture in the air is a most important factor in the growth of cane. This is determined from the readings of the thermometers known as the "dry" and "wet" bulb.

The dry bulb shows the external shade temperature of the air, while the wet bulb shows the external shade temperature of evaporation, and

Plate 7.—Cutters at Work in a Typical Canefield, Babinda, North Queensland.

is kept covered by wet muslin attached to a reservoir of water by strands of cotton which keep the muslin supplied by capillary attraction. When the wet bulb under these conditions reads over 80 degrees the weather is exceedingly oppressive, and should it go up to 88 degrees it is regarded as highly prejudicial to human life. The table hereunder gives the percentage of relative humidity in the principal coastal towns in the sugar districts at 9 a.m.:—

| Place. | Percentage of Humidity. |
|---|---|
| Bundaberg | 69·0 |
| Mackay | 75·0 |
| Ayr | 68·0 |
| Innisfail | 80·0 |
| Cairns | 70·2 |

### Frosts.

These principally do damage to sugar-cane in those districts from Mackay southward. More or less severe frosts occur every few years in the Bundaberg, Gin Gin, Maryborough, Mount Bauple, and Nambour districts, while parts of the Mackay district are occasionally affected. When cane is badly damaged by frost, the whole of the leaves become dry and yellow, and fermentation sets in down the stick, killing off the eyes. Unless such cane is quickly harvested and sent to a mill, deterioration sets in rapidly, the commercial cane sugar is greatly reduced, and it soon becomes unfit for manufacture. If possible, therefore, when cane becomes frosted, immediate arrangements should be made for its crushing.

### Droughts.

These rarely occur in the Northern sugar districts, and then only in a modified form. In some of the Southern sugar districts they take place periodically, and the only cure is an irrigation system.

### Pests and Diseases.

The sugar-cane plant is subject to many pests and diseases. The Government, by its Agricultural Department and Sugar Bureau, maintain a staff of entomologists and pathologists to assist farmers in the control of insect pests and cane diseases. Numerous bulletins are issued for the guidance of farmers, and officers make visits to farms and give advice on the spot. Full information and help can always be obtained by communicating with the Director of Sugar Experiment Stations, care of the Department of Agriculture and Stock, Brisbane.

The most serious insect pest is the white grub. "The grub" is the popular name given to the larvæ of certain cane beetles which feed on the roots of sugar-cane. Another severe pest in North Queensland is the weevil borer, which attacks the cane by boring into it.

Other insects, such as moth borers, caterpillars, wireworms, and white ants, cause loss to canegrowers.

The major diseases attacking cane in Queensland are:—Fiji, Gumming, Mosaic, Leaf Scald, Leaf Stripe, Red Rot. Bulletins dealing with the control of these diseases may be obtained from the Bureau of Sugar Experiment Stations.

**Do not neglect pests and diseases. Get advice at once.**

## Economics.

The price of sugar fluctuates from year to year, this being largely caused by seasonal variations. Under favourable climatic conditions over-production takes place, and this entails export of sugar abroad. The Australian price, which is at the present time £26 per ton, has to be pooled with the price that can be obtained for the product overseas. The amount received, therefore, varies in the proportion of exported sugar to that used for home consumption. The Queensland Government established a Sugar Board which deals with this aspect of the question and makes arrangements for the refining of the raw sugar. Arrangements have also to be made with the Commonwealth Bank respecting the financing of the exportable sugar. There is at the present time an embargo existing which prevents the importation of cheaply grown sugar from abroad, such sugar being produced by coloured labour. The price of sugar for the past three years has been as follows:—

| | £ | s. | d. |
|---|---|---|---|
| 1925 .. .. .. .. .. .. | 19 | 10 | 7 |
| 1926 .. .. .. .. .. .. | 24 | 10 | 10 |
| 1927 .. .. .. .. .. .. | 22 | 0 | 4 |

The exportable sugar for these years was:—

| | Tons. |
|---|---|
| 1925 .. .. .. .. .. .. | 211,000 |
| 1926 .. .. .. .. .. .. | 74,777 |
| 1927 .. .. .. .. .. .. | 152,384 |

On the price of sugar depends the price paid to the farmers for cane. This is regulated by another Board created by the Queensland Government, called the Central Sugar Cane Prices Board.

**The value of sugar produced in Queensland in 1927 was over £11,000,000.**

A Local Cane Prices Board is constituted under the Regulation of Sugar Cane Prices Acts for nearly every mill in the State, on which boards the canegrowers have equal representation with the millowners. These boards have independent chairmen. The boards meet annually to fix the price of cane and the conditions governing the delivery of same. An Award is made; but should either side consider it unfair or unjust an appeal lies to the Central Board.

**The Cane Prices Boards watch the farmers' interests.**

Prices are fixed in accordance with the analyses of the cane at most of the mills—that is, the growers are paid on what is known as the commercial cane sugar in the cane. The Central Board also restricts the growing of disapproved varieties of cane—i.e., those with low sugar content or which for other reasons are not considered suitable. Cane testers are employed at the mills to safeguard farmers' interests. Their duties include the supervision of the weighing, sampling, and the analyses of the cane. This ensures the canegrowers getting a fair deal. The average price paid for cane in 1914 was only £1 3s. per ton. During the last two years the average price has been about £2 1s. 3d. per ton. It can safely be said that the operation of the Cane Prices Act has put over one and a-half million sterling into the pockets of the Queensland canegrowers than would otherwise have been the case.

The following is a specimen of a Cane Prices Board Award:—

| Percentage of Commercial Cane Sugar. | When 94 N.T. sugar is £21 1s. per ton. | Increase or Decrease per £1 above or below £21 1s. 0d. |
|---|---|---|
| | £ s. d. | s. d. |
| 7 .. .. .. .. .. .. | 0 12 5 | 0 7 |
| 8 .. .. .. .. .. .. | 0 16 2 | 0 9 |
| 9 .. .. .. .. .. .. | 0 19 11 | 0 11 |
| 10 .. .. .. .. .. .. | 1 3 8 | 1 1 |
| 11 .. .. .. .. .. .. | 1 7 5 | 1 4 |
| 12 .. .. .. .. .. .. | 1 11 2 | 1 6 |
| 13 .. .. .. .. .. .. | 1 14 11 | 1 8 |
| 14 .. .. .. .. .. .. | 1 18 8 | 1 10 |
| 15 .. .. .. .. .. .. | 2 2 5 | 2 0 |
| 16 .. .. .. .. .. .. | 2 6 2 | 2 2 |
| 17 .. .. .. .. .. .. | 2 9 11 | 2 5 |
| 18 .. .. .. .. .. .. | 2 13 8 | 2 7 |

Deductions are made for burnt cane, diseased cane, bad topping, trashy or dirty cane.

## Labour.

The wages paid to field labourers and canecutters are governed by Awards of the Board of Trade, and these are altered from time to time. The Award now existing is as follows:—

### WAGES.

The rate of wages to be paid to employees shall not be less than the following:—

| | No. 1 District. | No. 2 District. | No. 3 District. |
|---|---|---|---|
| | Per Hour. | Per Hour. | Per Hour. |
| | *s. d.* | *s. d.* | *s. d.* |
| (1) Field workers, over 18 years of age .. | 2 $4\frac{9}{11}$ | 2 $3\frac{2}{11}$ | 2 $2\frac{1}{11}$ |
| (2) Youths from 14 to 16 years of age .. | 1 $3\frac{8}{11}$ | 1 $1\frac{10}{11}$ | 1 $0\frac{9}{11}$ |
| Youths from 16 to 18 years of age .. | 1 $6\frac{3}{11}$ | 1 $5\frac{2}{11}$ | 1 $3\frac{3}{11}$ |
| Cane cutters (day labour) .. .. | 2 $10\frac{9}{11}$ | 2 $8\frac{7}{11}$ | 2 $7\frac{9}{11}$ |
| | Per Week. | Per Week. | Per Week. |
| Field workers (over 18 years of age) engaged by the week .. .. .. .. | £ *s. d.* 4 16 0 | £ *s. d.* 4 10 0 | £ *s. d.* 4 6 0 |

### CANECUTTING—WAGES AND CONDITIONS.

(1) Notwithstanding the rate hereinbefore provided for canecutters' day labour, an employee may contract with his employer to cut cane at piecework rates.

No canecutter shall be employed other than by day labour or at piecework rates.

(2) The minimum rates which shall be paid by the employer for cutting cane for harvesting at piecework rates shall be according to the following scale:—

| | No. 1 District. | No. 2 District. | No. 3 District. |
|---|---|---|---|
| | *s. d.* | *s. d.* | *s. d.* |
| 15 tons to the acre and over .. .. | 8 0 | 7 9 | 7 6 |
| 14 to 15 tons to the acre .. .. .. | 8 3 | 8 6 | 7 9 |
| 13 to 14 tons to the acre .. .. .. | 8 6 | 8 3 | 8 0 |
| 12 to 13 tons to the acre .. .. .. | 9 0 | 8 9 | 8 6 |
| 11 to 12 tons to the acre .. .. .. | 9 6 | 9 3 | 9 0 |
| 10 to 11 tons to the acre .. .. .. | 9 9 | 9 6 | 9 3 |
| 9 to 10 tons to the acre .. .. .. | 10 8 | 10 5 | 10 2 |
| 8 to 9 tons to the acre .. .. .. | 11 2 | 10 11 | 10 8 |
| 7 to 8 tons to the acre .. .. .. | 11 8 | 11 5 | 11 2 |
| 6 to 7 tons to the acre .. .. .. | 13 2 | 12 11 | 12 8 |
| 5 to 6 tons to the acre .. .. .. | 16 2 | 15 11 | 15 8 |

The rates for canecutting in the Proserpine district shall be $1\frac{1}{2}$d. per ton more than those in the No. 2 district.

A Form of Agreement for cutting is provided in the Award, and can generally be bought at printers' and stationers' shops in canegrowing districts.

**No agricultural industry in Australia employs so much manual labour or distributes so much capital.**

## Cost of Production of Cane.

This naturally varies in different localities and under seasonal variations. The cost in one district is often totally different to the cost in another. The more cane produced per acre the lower, as a rule, is the cost of production of a ton of cane. There are so many factors entering into the cost of production that it is not possible at present to give definite figures.

PLATE 8.—HAULING CANE TO THE MILL.

## Government Assistance.

The Bureau of Sugar Experiment Stations, a sub-branch of the Department of Agriculture, was established by the Queensland Government in 1900.

This institution has at present three Sugar Experiment Stations—one at Mackay, one at Bundaberg, and a third on the Johnstone River near Innisfail. Laboratories are established at which soil investigations are undertaken, and analyses of fertilisers, limestones, waters, sugar-canes, and sugar-mill products are carried out for growers and millers.

The introduction of new varieties of cane from other countries and the raising of a large number of seedling canes is a part of the work of the Bureau. The testing of these upon commercial lines in laboratory and field entails much investigation. In addition to this, experiments in cultivation, rotation, fertilising, and irrigation are carried out.

Entomological Stations are in existence at Bundaberg, Mackay, and Cairns. Pathological investigations into diseases of sugar-cane are carried out by a staff of trained men.

**Queensland's sugar production in 1870 was 2,851 tons; and in 1927 was 485,745 tons.**

## Financial Aid.

The Government assist farmers through the Agricultural Bank. The maximum amount that may be advanced to any one individual cane farmer or on any separate proposition is £1,700. The money may be utilised for the payment of liabilities already existing, the effecting of improvements, purchase of stock and plant, and for other purposes in connection with the undertaking.

The rate of interest on loans, excluding those discharging liabilities, is at present 5 per cent. per annum. The rate of interest for advances involving the discharge of liabilities for purchase money or mortgages is 6 per cent.

The term of the loan is fixed when the advance is approved, up to a maximum of twenty-five years, which includes a period of five years during which interest only is payable.

General details as to the securities required and other conditions attaching to advances may be ascertained on reference to the pamphlet issued by the bank.

It may be pointed out that many of the growers obtain seasonal assistance on the security of crop liens, to which the bank usually raises no objection in cases where it is interested.

Many thousands of pounds have been granted to growers in the principal canegrowing districts of Queensland. A large proportion of such advances was made for the purpose of releasing existing liabilities on the holdings.

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

# RURAL ROUTES IN QUEENSLAND.

## THE WORK OF THE MAIN ROADS COMMISSION.

**The Seventh Annual Report of the Main Roads Commission, from which the subjoined notes have been taken, commends itself strongly to all concerned with rural progress in Queensland.**

**A web of well-constructed arterial highways is spreading gradually over the State. This is a result of the soundly organised work of the Commission in conjunction, when necessary, with Local Authorities. A survey of a year's achievements leaves the impression that the Commission is one of the most important factors in our country life.**

**Through the courtesy of the Commission we are enabled to reproduce some of the excellent plates included in its Report, and which illustrate the immense value of its community services.—Ed.**

### SUMMARY OF OPERATIONS.

IN the course of the year a length of 683 miles of main roads was gazetted, while the total of developmental roads was increased by 104 miles. This makes the total lengths as at 30th June, 1928—5,576 and 362 miles respectively.

Two hundred and twenty-eight miles of road were completed and 130 miles were partially completed during 1927-28 in the area of ninety-four Local Authorities. In addition 2,035 lineal feet of bridges and culverts over 3-feet span were completed and 3,327 lineal feet were partially built. This makes the total length of works completed (and the equivalent in partially constructed work) 890 miles of road and 13,200 lineal feet of bridges, representing an approximate average cost of £3,321 per mile, inclusive of bridges, a number of which have been of some magnitude, or £2,763 per mile, exclusive of bridges.

Maintenance works were carried out on over 5,030 miles of road in 113 Local Authority areas. These works included the reconstruction and maintenance of bridges, and complete patrolling and seasonal maintenance of roads constructed under the Main Roads Acts and Federal Aid Roads Agreement.

Compared with the year ending 30th June, 1927, the number of Local Authority areas in which permanent works and maintenance has been carried out has increased by 12 and 9 respectively.

It is interesting to compare road expenditure in this State with that of the United States, with its population of 115,000,000 and area of 3,027,000 square miles. The annual main road expenditure of the United States approximates 23s. 3d. per head or £44 per square mile. Queensland, with a population of 911,700, expended last financial year an amount of £678,399 on permanent works on main roads, equal to 15s. per head or £1 0s. 3d. per square mile. The total expenditure incurred by the Commission on permanent works and maintenance for the year amounts to 18s. 2d. per head or £1 4s. per square mile.

The average costs under the Federal Aid programme in the United States of America for the fiscal year 1928 are between £5,000 and £6,000 a mile, but in Queensland it is necessary to make our money go nearly twice as far.

The ratios of mileage completed during last year to population in Queensland amounted to 1 to 3,400, as compared with that of the United States of America in the year 1924, viz., 1 to 7,400. This comparison is not intended to show that road work is being carried out more cheaply than in the United States of America, but to show that we are endeavouring to serve our vast areas and sparse population in the way most needed.

The report of the British Ministry of Transport 1926-27 indicates main road allocations of £18,050,000. It is worthy of note that maintenance costs in Great Britain have increased from £273 per mile in 1921-22 to £356 per mile in 1925-26.

It is common to read of the advocacy of the construction of hundreds of miles of roads paralleling our western railways. A moment's thought will convince most

people that the interest, redemption, and maintenance would be much greater than the possible return, and that road construction is much more urgently needed in other directions. This does not, of course, apply to the construction of bridges or flood crossings on the type of route mentioned, the want of which is often a serious drawback.

A bulletin setting forth the results of labours and investigation by the Commissioner's officers into the aspects of road building, trend of motor vehicle registration, census of traffic, road protection regulations, soil sampling and examination and its practical application to road building is in process of collation.

It may be asserted confidently that, with the technical staff available well seconded by an accounting and clerical staff which has given of its best, the maximum output of work consistent with economical design, construction, and maintenance has been achieved.

The Local Authorities have in most cases effectively supervised and aided construction under the direction of the Commissioner's engineers, who have maintained close touch with the Local Authorities and have made full use of the local knowledge so necessary for the practical solution of many phases of road building.

PLATE 9.—ISISFORD SHIRE.

Reinforced Concrete Bridge over the Barcoo River, near Isisford, on Isisford–Emmett Road, in course of construction.

Failures of work have been of a minor nature and have always been turned to profit by the avoidance of similar mistakes in future works.

The recording and investigation of any defects appearing is a most important matter if progress is to be maintained, for it would be idle to claim that all work executed under so great a scheme as the main roads one has reached the acme of perfection. In a few instances deliberate risk of surface failure has been taken on short sections with a view to ascertaining whether economy could be effected in paving thickness or by the use of local materials.

In the course of the Report the finished jobs and works in progress in different parts of the State, both in agricultural and pastoral districts, are interestingly reviewed, and a full list of them is included. The Report also contains much useful information as to specified requirements in respect to different classes of jobs undertaken by the Commission, as well as plans and plates showing the several methods of construction adopted.

PLATE 10.—PIONEER SHIRE.
A Bitumen-surfaced road through canefields, Mackay District.

PLATE 11.—PIONEER SHIRE.
Mount Ossa–Kungurri Road, which will serve recent settlement in sugar-growing country.

Plate 12.—Gayndah Shire. Gayndah–Goomeri Road.

Curved reinforced concrete low-level bridge over Barambah Creek, replacing an old crossing upon which traffic was regularly blocked for several months in the year. Maximum flood-level, 90 feet above stream bed.

Plate 13.—Kolan Shire. Gin Gin–Miriam Vale Road.

Black Gully Bridge, typical of many similar structures erected in the course of the year.

PLATE 14.—KOLAN SHIRE.
Gin Gin–Miriam Vale Road, showing a gravelled section.

PLATE 15.—CLIFTON SHIRE. TOOWOOMBA–GOONDIWINDI ROAD.
Gravelled section in the wheat area.

Plate 16.—Shires of Tarampa and Cambooya.
Heifer Creek deviation, on the direct road between Clifton and Grantham.

Plate 17.—Cambooya Shire. Cambooya–Goondiwindi Road.
Heavy traffic—penetration bituminous macadam—section over black soil.

PLATE 18.—INGLEWOOD SHIRE.
Gravelled section, Inglewood-Texas Road.

PLATE 19.—BUNGIL SHIRE. ROMA–NORTHERN ROAD.
Arresting creek erosion across road by V concrete drops.

Plate 20.—Shire of Bullo. Quilpie–Eromanga Road.
Typical flood invert under construction.

Plate 21.—Paroo Shire.
Low-level reinforced concrete bridge over Paroo River at Eulo,
on Cunnamulla–Thargomindah Road.

PLATE 22.—BEAUDESERT SHIRE.
Brisbane–Mt. Lindsay Arterial Interstate Road, showing intermediate course of metal now being covered with penetration bituminous macadam.

PLATE 23.—MAIN SOUTH COAST ROAD. COOMBABAH CREEK BRIDGE, SOUTHPORT DEVIATION.

Plate 24.—Main South Coast Road, near Southport,
showing timber groynes and brush fences which have arrested wave action.

Plate 25.—Nerang Shire. Mudgeeraba–Springbrook Road,
on which one-way traffic is regulated.

PLATE 26.—SHIRE OF NERANG. CURRUMBIN CREEK DEVIATION, which eliminates several creek crossings and steep gradients.

## QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The tree which is the subject of this note and the accompanying illustrations is sometimes known as Yellow Tulip. This name originates from the remarkable resemblance of the bark to that of the Tulip or Tulipwood. The colour and markings of the bark are very similar in the two trees. In botanical terminology the Yellow Tulip is known as *Hemicyclia australasica*. The Tulip or Tulipwood is *Harpullia pendula*. The Yellow Tulip is a very common tree in many of the rain forests or "scrubs" from Port Macquarie, New South Wales (J. H. Maiden) to Cairns in North Queensland. It also occurs on Lord Howe Island. It appears to be most common in the scrubs of the drier areas or on fairly dry ridges. The trees attain a height of about 90 feet, and a stem diameter of about 2 feet, but the majority of the trees met with are much smaller. The freshly-cut wood is pale yellow in colour. It is very finely grained, fairly heavy, uniformly coloured, and not highly figured. Mr. E. H. Swain ("The Timbers and Forest Products of Queensland," p. 322) states that the wood could be used in place of English Boxwoods for rules, gauges, and small turnery. He quotes Mr. R. T. Baker to the effect that it would make good heads for golf clubs. The wood is not comparable with Tulip in colouring or ornamental effect. The Tulip, which is also a native rain-forest species, will be illustrated and remarked upon in a future issue.

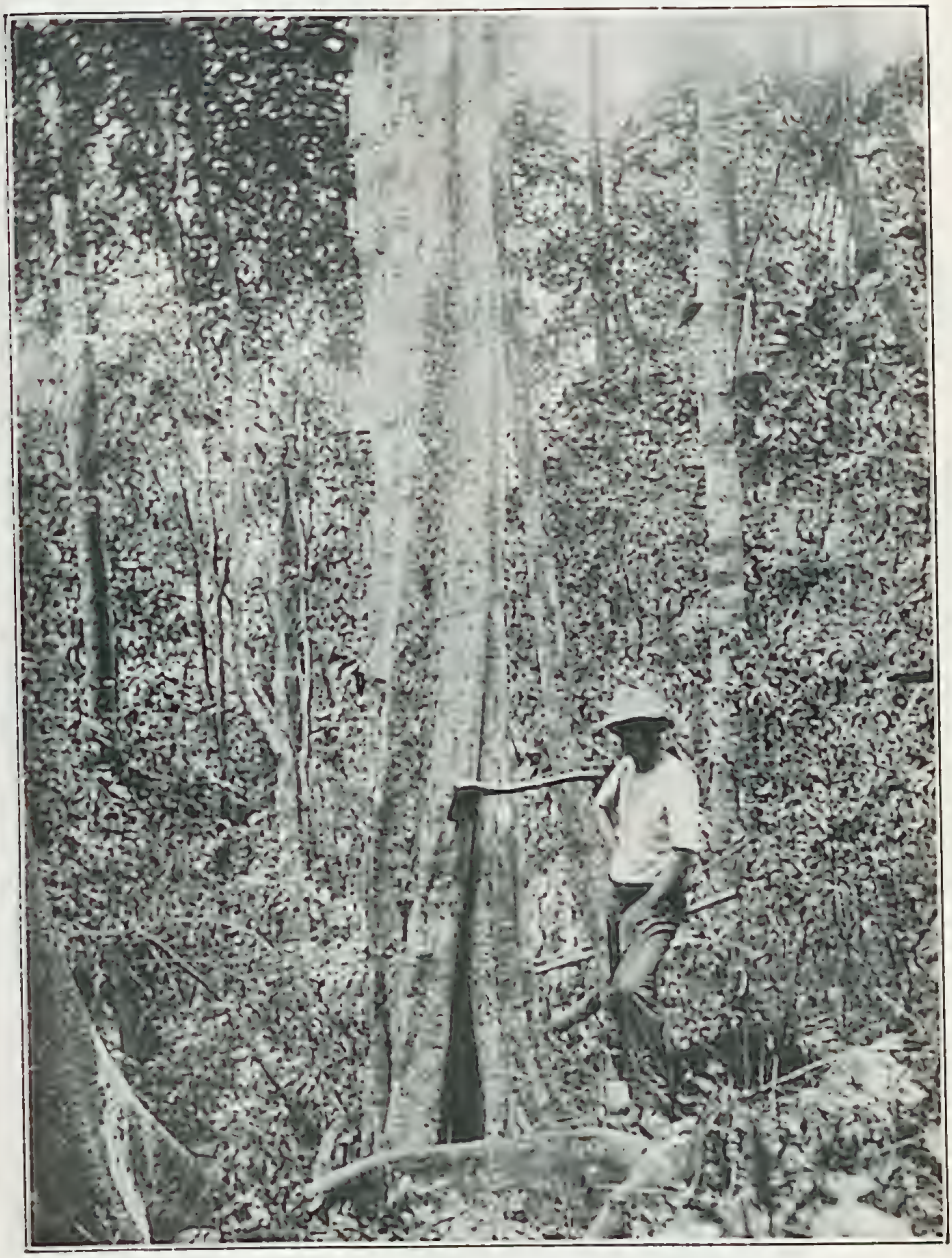


*Photo.: W. D. Francis.*]

PLATE 27.—YELLOW TULIP (*Hemicyclia australasica*).

A tree in the Kin Kin Rain-forest.

*Photo.: Dept. Agriculture and Stock.*]

PLATE 28.—YELLOW TULIP (*Hemicyclia australasica*).

The twig on left is flower-bearing; the one on the right bears an immature fruit.
The leaf below is from a coppice shoot.
A, dry fruit; B, hard, inner part of fruit containing the seed.

# THE QUALITY OF QUEENSLAND BANANAS.

The Deputy Premier and Minister for Agriculture (Mr. W. Forgan Smith) made the following statement to the Press recently:—The statement attributed to Mr. Minns, of the Metropolitan Markets, Melbourne, regarding Queensland bananas, cannot be allowed to pass without some comment. His reference to bananas not being fit for pig food is the kind of broad sweeping statement that we are becoming used to from certain sources. The effort that was made by certain interests to prevent Queensland meat being sold in Victoria will be remembered. The Victorian State authorities have ample power under their domestic legislation to protect the public against the sale of any product unfit for human use.

Fruit is a commodity that is perishable in character, and in all markets throughout Australia and throughout the world large quantities have often to be condemned, and, no doubt, occasion for this arises with regard to every product.

Queensland imports potatoes, apples, and other products from Victoria, and quite frequently quantities have to be condemned on arrival here. These things happen in the ordinary course of events, and officers are employed by the Health and Agricultural Departments to protect the public in regard to food values of produce offered for sale. Victoria is a large fruit producer, and the fewer bananas sold in that State the greater demand there would be for their own locally grown products. This establishes a form of interest and causes propaganda to be used similar to that with which we became familiar in connection with chilled meat from Queensland. The Queensland Government suggested to the other States (Victoria included) that they should adopt certain minimum standards for bananas, and in every way we have helped within our constitutional powers to see that only suitable qualities are marketed.

## Maintenance of Grades and Standards.

Farmers themselves, in regard to the production of all commodities, should exercise the utmost care in ensuring that grades and standards are maintained, and the highest possible marketing conditions established. It is interesting to note that much of the current public comment synchronises with the attempt by the banana growers' own organisation to establish a more orderly form of marketing which is designed to give the form of control that is necessary to maintain high standards. If this is carried out properly, a marketing and ripening system can be inaugurated which will cause many of the present difficulties to disappear, but in adopting such a system certain people who get a large rake-off under present conditions may be affected; hence the hostile propaganda that is at present being used.

## Some Causes of Low Quality.

The reference in leading articles in certain newspapers to taxation and wages is quite beside the point, cutters and packers being the only ones covered by the basic wage in the banana industry, and very few men are employed as wage earners. Surely no one can argue that a protected industry should deny workers reasonable wages standards. The reference in the "Courier" leading article to the average income of banana growers is based on a broad arbitrary generalisation which trained economists would be very cautious in accepting. Time and again this Department has called attention to the causes of the difficulties from the point of view of production. These are—

(1) The attempt to grow bananas on land not suitable for the purpose;

(2) The harvesting of bananas on land of depleted fertility;

(3) Faulty methods of cultivation; and

(4) Faulty packing and inefficient methods of ripening.

## Protect Queensland's Interests.

These phases of the industry can, of course, be unduly emphasised, for a large proportion of banana growers are alive to the position, and are producing and marketing bananas of good quality, and those men are making a fair living. With proper methods of cultivation and suitable land, and with proper marketing organisation, the industry can be stabilised and give a remunerative return to a large section of the population. Newspapers in their comments on this industry should guard themselves against being used for purposes antagonistic to Queensland interests.

# Answers to Correspondents.

## BOTANY.

*The following replies have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—*

### Johnson Grass.

W.D.D. (Rosewood)—

Your specimen is the Johnson Grass (*Sorghum halepense*), introduced into Queensland many years ago and highly boomed as a fodder. There is no doubt that Johnson Grass provides a great deal of forage, but its habit of spreading by means of long underground rhizomes or runners renders it a pest in cultivation, and it is generally recommended that where it is desired to use it as a fodder that the field should be devoted to Johnson Grass and to nothing else. The grass is better suited to cutting than to feeding off. Like other members of the Sorghum genus (''family''), care must be exercised in feeding, as it contains a prussic acid yielding glucoside which has proved fatal to stock on one or two occasions in Queensland. Therefore, it is best, perhaps, to cut the grass and allow it to wilt for a short time before feeding. The same remarks, of course, apply to Sudan Grass, Imphee, and other members of the Sorphum genus.

### Specimens Identified.

S.F.L. (Samford)—Your specimens are:—

1. *Smilax australis.* A climbing plant of the family Liliaceæ, belonging to the same genus (*Smilax*) as the sarsaparilla of commerce.
2. *Bœckea virgata.* Family Myrtaceæ. A small shrub common on the creek sides in South-eastern Queensland. It is also found in New Caledonia. The name ''Wild May'' is, I think, more commonly applied to an allied plant—*Leptospermum flavescens*, with somewhat larger flowers. The name, however, is quite appropriate.
3. *Polygonum lapathifolium.* Family Polygonaceæ. ''Smart Weed'' or ''Water Pepper.''
4. *Mallotus claoxyloides.* Family Euphorbiaceæ.
5. *Solanum sodomæum,* the Apple of Sodom or Devil's Apple. A native of the Mediterranean region naturalised in various parts of the world.
6. *Solanum aculeatissimum,* the Devil's Apple. A native of South America now naturalised in many parts of the world.
7. *Mezoneurum Scortechinii.* Family Leguminoseæ. Commonly known as Barrister or Wait-a-While; the latter name is applied to a good number of prickly vines.
8. *Homalanthus stillingiæfolius.* Family Euphorbiaceæ. I do not know a common name for it.

### Wild Radish or Wild Turnip.

C.H. (Proston)—

Your specimen is *Raphanus raphinistrum,* the Jointed Charlock or Wild Radish, also commonly known as Wild Turnip and by other names. The weed is a common European one that is now widely spread over the cooler parts of the world. It is not known to be poisonous, but like other members of the turnip and cabbage family, if eaten in quantity it will cause hoven or bloat if the animals have fairly empty stomachs.

### Dodder.

J.M. (Nanango)—

Spraying infected patches of Dodder with a dip mixture should be successful. Spraying of Dodder in other places has been done with success. This plant can be spread by grazing stock eating the plant containing the seeds, the seeds afterwards germinating; the plant can also be spread by broken parts being carried about from one place to another. It is hard to say how it has got into your place, but the particular sort of Dodder you sent is quite commonly seen as a pest growing over weeds, &c., in paddocks and along railway lines. Keeping the paddock closely grazed or cut would assist in eradicating the Dodder if the plant proves troublesome.

# FORAGE POISONING IN ANIMALS.*

## SYMPTOMS AND CAUSES.

Though forage, or fodder, poisoning is microbic in origin like anthrax, tuberculosis, &c., it differs from those diseases in that it is not necessary for the microbe to attack the animal directly; that is, to invade its body. The microbe is in the feed, and it is there that it does its deadly work (states a bulletin written by Dr. H. R. Seddon and Mr. G. Edgar, and issued by the New South Wales Department of Agriculture). The microbe, moreover, does not cause any disease in living plants, but attacks them only after death, usually growing and multiplying with the microbes that produce decomposition.

The particular microbe that causes forage poisoning is *Bacillus botulinus*. Four distinct types of it are known to exist, and while the symptoms produced by all are identical, differences exist in the poison produced by each type. Horses are most commonly attacked, because they are fed more on prepared fodder than other animals. However, cases in cattle are by no means uncommon, and even sheep and pigs may be affected at times.

Inability to swallow food is the most important symptom of the disease, and one on which chief reliance is placed for diagnosis. As might be expected, there are various degrees of poisoning, depending on how much toxin the animal has absorbed. The acute type follows on the taking into the system of a large quantity of poison, and its onset is sudden and course rapid. Careful observation will reveal listlessness, slight inco-ordination in gait and clumsiness in eating. Then follows the typical symptoms of "paralysis" of the tongue, and the muscles which perform the act of swallowing, salivation being marked at this stage. The duration of these symptoms varies. Sometimes they are manifested for several hours, even a day or more, but in others they may be of much shorter duration, and particularly if they occur at night, or at other times, when the animal is not under close observation, they may escape notice altogether.

Following the paralysis of the tongue and throat, the animal loses co-ordination of the limbs, and usually soon goes down. This may, in fact, on account of the non-observation of earlier symptoms, be the first thing noticed in very acute forms of the disease. There are no manifestations of pain, but the animal struggles ineffectively to regain its feet, these efforts ultimately passing to a paddling action with both the fore and hind limbs. This action is not continuous, but occurs at somewhat frequent intervals after the animal goes down. Affected animals are usually constipated, owing to a certain degree of paralysis of the muscles of the walls of the bowels. The temperature is usually lower than normal, except in cases where the animal becomes distressed to some extent from struggling, but it is never high. Respirations are slower, but the pulse rapid. Affected animals may lie on the ground for one to three or four days, depending upon the amount of poison (toxin) that has been absorbed. Finally, however, death supervenes, the animal being conscious almost to the end.

A chronic form of the disease has been termed "sleepy staggers," and such indicates very clearly the symptoms shown by an animal. It is dull and listless, and shows a distinct disinclination to move; when made to do so, it is noticed that the gait is laboured, the feet not being lifted clear of the ground, and the step is short. Salivation and nasal discharge are fairly profuse, and though swallowing is extremely difficult it is not entirely suspended. The animal is able to swallow small quantities of food provided it is moist, but has great difficulty in swallowing dry food. Mastication is extremely slow, and a proportion of the food drops from the mouth. Animals suffering from this form may live for weeks and gradually waste away, the abdomen assuming a pronounced "tucked-up" appearance. A very small number of chronic cases recover, but convalescence is very prolonged. It must be emphasised, however, that all stages intermediate between the acute and chronic types of the disease may occur.

It is said that any kind of fodder may at times be infected with the microbe, and though it may be found in pastures as well, the experience in Australia is that in the great majority of cases, animals which have been fed on some form of conserved fodder—hay, chaff, grain, or silage—are affected. It is found, however, that certain of these fodders are more liable than others to be dangerous, and to realise why this should be it is necessary to review what is known of the causal microbe; where it is found, how it may get into fodder, and how it grows and produces its poison therein.

* From the "Pastoral Review" for October, 1928.

The microbe may be found in soil, dust, or water, and ordinarily lives therein, gaining its nutriment from dead (decomposing) vegetable material. It is not capable of directly attacking plants or animals in the living state. The writers of the bulletin state that no exact knowledge is available as to how common it is in the soils of New South Wales, but such examinations have been made in other countries (and are being made in Australia), and give grounds for the belief that it is far from uncommon. This is supported by the fact that cases of the disease have been met with in recent years in the Young, Warren, Coonamble, Gundagai, Murwillumbah, Inverell, Riverina, and Narrabri districts of New South Wales.

Being in the soil, the microbe easily gains access to such fodders as hay, chaff, and silage, per medium of the dust raised from the surface soil. It then requires suitable conditions of moisture and warmth in order to multiply. The microbe is microscopic, and even when multiplying in fodder does not produce any recognisable changes. Conditions which favour its growth, however, also favour the growth of other micro-organisms, particularly moulds, and thus it is frequently found growing in mouldy fodder. This, however, is not entirely a chance arrangement, for whereas ordinarily this bacillus can grow only in the absence of air, it can grow in fodder exposed to air if it has a mould growing over it. Thus mouldy fodders are more liable to contain the microbe and be dangerous.

Silage is specially liable to be attacked, owing to two factors—(1) its high moisture content, and (2) its liability to become mouldy. As is well known, a well-prepared pit or silo of silage shows no mould through the greater part of the stack, but only on the surface, and it is just this mouldy surface layer which is liable to be dangerous. If silage be exposed, however—particularly if a pit be opened and exposed to the weather—the exposed part, previously sound, becomes mouldy, and, if it has been contaminated by soil containing the microbe, is liable to contain the poison and to be dangerous. The point is that good, wholesome silage is not likely to be harmful. Damaged mouldy ensilage may be dangerous, and should not be fed.

While closely-cropped grass is not likely to be dangerous, tussocky grass, particularly the rank growths found near creek beds or on inundated land, may easily contain much dead material, both leaf and stalk, and such clumps may be somewhat damaged and mouldy about the butt. Also in harvest fields, where winnowing is carried out in the paddock, the site of the winnowing operations may be a danger spot. When rain has fallen the sprouted grain is readily sought by any animals which may be grazing in the paddock, and as they nose about in search of it are likely to gather some decomposing harvest refuse. Such material offers most suitable conditions for the multiplication of the poison-producing microbe, and there are several cases on record of the disease having been contracted under these circumstances.

There are two other facts concerning the poison that must be borne in mind—namely, that among poisons it is ranked as one of the most powerful, and that it is soluble in water.

In consequence of the latter it is easily washed from that part of a stack where it was produced to some other part, and thus it may be found that fodder which appears quite sound itself may, by having been overlaid with damaged fodder and exposed to rain, have had sufficient of the poison washed into it to cause the disease. A further point is that as the poison is so powerful, sufficient to cause mortality may be produced in small "pockets" of mould in the fodder, such pockets being so small and infrequent as to be easily overlooked.

It is not always possible to determine how the fodder has become harmful, and frequently it is impossible to detect the microbe in the suspected material. The issue is further complicated by the fact that in common with other bacterial poisons, but unlike such poisons as strychnine and arsenic, this poison produces its effects only after an interval of some days, usually three to seven. Thus, it is not the feed the animal ate the day before it became ill, but that eaten a week before, that contained the poison.

In the absence of any reliable means of telling if fodder is infected with the microbe or otherwise, owners of stock should, as far as possible, see (*a*) that only sound stuff is fed, (*b*) that where fodder is badly damaged, such damaged portions are burnt, and (*c*) that in order to minimise such loss of fodder, proper care is taken in the protection of stacks, &c., from (1) the effects of wet weather, and (2) attacks by mice.

At the present time there is no method that can be relied upon for the successful treatment of affected animals. It is possible to immunise animals against the condition by means of an antitoxin, but such is very costly and the immunity of short duration, and, with the disease affecting such comparatively small numbers of animals, and being of uncertain occurrence, immunisation is not a practical measure for the control of the disease.

# THE PRACTICAL APPLICATION OF METEOROLOGY TO AGRICULTURE.*

## WEATHER FORECASTS—CLIMATOLOGY—WIRELESS ON THE FARM.

*The progress, attained since the war, in the technique and distribution of weather forecasts, and in the use of meteorological apparatus adapted to agricultural needs, has convinced the rural population of the older countries of the advantages which they can derive from the two principal branches of meteorology—weather forecasting and climatology.*

*Since its formation, in 1921, the French National Meteorological Office has seen, each year, a growth in the demand for information on the part of agriculturists, viticulturists, horticulturists, agricultural syndicates, &c. For the first time in France, the establishment of a close collaboration between agriculturists and meteorologists is in a fair way towards realisation. Meteorologists now know exactly what is required by agriculturists, who, in their turn, know more precisely what they may expect from meteorological science.*

*The subjoined account of the way in which meteorology is applied to agriculture in Europe is therefore of especial interest to Queensland farmers.*

## I. WEATHER FORECASTS.

### Principles of Weather Forecasts.

FORE-KNOWLEDGE of the weather of to-morrow and the following days is of the utmost interest to the farmer, especially in certain seasons. The question of weather forecasting has occupied the attention of agricultural circles from remote times, though it was not until the second half of the nineteenth century that it was solved scientifically. In 1857, the French astronomer, Le Verrier, concluded that it would be possible, from daily meteorological charts, to predict some hours in advance the arrival of atmospheric disturbances, and, in consequence, probable changes in weather. The principle of scientific forecasting of weather has made much progress since that time. Wireless, in particular, has allowed the construction of more complete charts, through rapid centralisation of observations, not merely from the whole of Europe and Northern Africa, but from ships at sea, especially those in the Atlantic. This last information has the immense advantage of giving information of the arrival of disturbances from the Atlantic, to which France is specially exposed by reason of its geographical situation on the West of Europe.

There were three principal stages in the successive improvement of the technique of weather forecasting—

(1) Up to 1914, forecasts were based almost exclusively on the examination of isobar charts. These charts show the zones in which pressure decreases from the outside to the centre (depression) or increases from the outside to the centre (anti-cyclone). The track of depressions or anti-cyclones can be followed on charts drawn up every 12 hours; their position 24 hours later can be deduced, and, in consequence, the weather they will bring to the district under consideration can be forecast. These deductions, unfortunately, are not always correct. The movement of depressions which, in general, takes place from west to east is not always very regular. The track curls and turns back, the speed is variable and, like that of anti-cyclones, the track is influenced by many factors. It is the resultant of all these factors which determines the movement of pressure centres, and the difficulty of forecasting will, therefore, be understood.

(2) During the war, this method was improved by adding to it the method of barometric variations. There are drawn on charts, lines of equal variations, that is to say, lines passing through all the points at which

*Translated and summarised by Mr. W. R. Black (Ministry of Agriculture and Fisheries, U.K.) from an article by Mons. J. Sanson (Chief of the Climatological Service of the French National Meteorological Office) in "La Grande Revue Agricole," March, 1928, and reprinted from "The Journal of the Ministry of Agriculture," (Great Britain) for October, 1928.

barometric pressure has varied to the same extent during the determined period. These lines show zones of increase or decrease and their track is much more regular than that of depressions or anti-cyclones which they accompany and their speed is fairly constant in each season. A study of their evolution furnishes valuable indications for the forecasting of isobar situations.

(3) There is a striking connection between the zones of variation of pressure and cloud systems. The study of cloud systems is the latest improvement made in the meteorological services of France for weather forecasting. If cloud charts are drawn up it is seen that clouds are grouped in large extended masses which are well-organised and move in a system known as the cloud system, which has four parts: (*a*) A front composed of high clouds partly covering the sky. This first part heralds the approach of a zone of low pressure. (*b*) A centre formed by a uniform veil of clouds of average height accompanied by low clouds giving continuous rain. This centre coincides with the zone of low pressure itself. (*c*) A tail with the sky alternately almost clear and very cloudy from the debris of clouds at all heights, giving a succession of showers, storms and fine weather. This tail accompanies the arrival of the zone of high pressure. (*d*) On the borders of this system, there are margins in which there are only high or average clouds. Cloud systems move most often in a series coming from the south-west, from the west or from the north-west. In the interval between two cloud systems the sky is clear or has local clouds which appear in the morning and disappear at night, but continuous fine weather is only experienced in general in zones of high pressure which are not touched by zones of variations.

It is by the combined study of isobar charts, charts of variation in pressure, and charts of cloud systems that rational forecasts of weather can be made.

## Distribution of Agricultural Warnings by Wireless.

Once these weather forecasts are made out, they must be brought to the notice of agriculturists as quickly as possible. Great progress was made in this direction in 1922, when the National Meteorological Office began to distribute its bulletin four times a day by wireless from the Eiffel Tower. These warnings contain, for each of the 12 regions into which France has been divided for the purpose, information on the general character of the weather, wind, rainfall, temperature, and the possibility of dangerous phenomena for agriculture—such as frosts, storms, hail, &c.

Since August, 1927, a further improvement has been introduced into the distribution of these agricultural warnings. The Compagnie Francaise de Radiophonie decided to issue each day, at 7 p.m., an agricultural meteorological communiqué specially adapted to the needs of farmers in the north of France and in the neighbourhood of Paris. This communiqué is drawn up by a group of agricultural experts and practical agriculturists with a high reputation in agricultural circles. They are in daily contact with the forecast service of the National Meteorological Office, and are thus kept in touch with all modifications in the weather situation revealed by the charts mentioned above. Being in full possession of all the facts, they can make such comment on the forecasts drawn up by the National Meteorological Office as will be of use to the rural population, and draw conclusions enabling the latter to employ their time to the best advantage on the morrow (e.g., in cultivations, ploughing, manure-spreading, irrigation, harvesting, &c.). The commentators also report on the need for preventive treatment when the atmospheric conditions are favourable to the development of fungus diseases, or for protective treatment when there is a likelihood of frosts, or for increasing the dressings of certain manures to counteract excessive humidity or drought; the commentators also give advice of a more general kind adapted to the climate of each region—for example, the use of a certain variety of wheat or the possibilities of a catch crop. In short, they give agriculturists, in an assimilable form, the means of drawing the maximum profit from the weather forecasts of the National Meteorological Office.

This innovation could not have been better received in rural circles, and it is hoped, as a result of this initial success, that it will not be long before the regional stations of the National Meteorological Office are provided with sufficient staff and material to enable them to participate in this service. Farmers in all parts of France could thus benefit from communiqués specially drawn up for their respective regions by meteorologists who know the local climatology well, and who work in the closest collaboration with practical agriculturists of the country.

## II. CLIMATOLOGY.

### (a) General Application of Climatology in the Improvement of Crops.

Weather forecasting is not, as generally thought, the only branch of meteorology which can be useful to agriculturists. There is a second—Climatology—of which many agriculturists are unaware, which can, however, render them considerable service. A precise knowledge of climate, that is to say, of the meteorological elements not solely of the air in which we live, but of the air at the surface of the soil and in the soil, can play a capital part in agriculture for the following reasons:—

(1) It will help to increase yields by facilitating the choice of varieties of crops best adapted to the climate; varieties resistant to cold in the east, or drought in the south; early varieties in regions where the heat of July causes "burning" to be feared; varieties of which the critical periods (earing of cereals for example) coincide to the maximum of probability with favourable meteorological phenomena.

(2) It affords a powerful aid in the application of preventive treatment against fungus diseases. Two kinds of conditions are needed for the development of these diseases, those favourable for the fungus and those predisposing the plant to disease. High temperatures, drought, and a high exposure to sunlight are factors propitious to fungi attacking the plant, which is already weakened by a partial withering of its tissues; they form, on the contrary, a powerful obstacle to the development of the propagative organs of the fungus, whose existence they menace. On the other hand, a soft and humid weather favourable to the fungus produces the maximum of turgescence in the tissues of the plant, which is thus better able to resist fungus attack. In order to produce an epidemic it is necessary that these two opposite kinds of conditions must immediately succeed each other, leading, in the first place, to predisposition of the plant to attack, and then to the development of the fungus before the plant can react. Thus at the beginning of the warm weather the plants wither in the day time; now if, in the course of the night, temperature is lower and a mist is produced (an element propitious for the propagation of fungus spores) the fungus attacks the plants, which will not have had time sufficiently to regain their turgescence and the epidemic will break out. On the basis of these data, and from the observation that potato blight always travels from west to east, one can, in certain conditions of temperature and humidity, and with observation posts judiciously placed, announce the probable advance of this disease in a given region and advocate the necessary preventive treatment.

(3) It will sometimes allow measures to be employed to counteract certain atmospheric phenomena which are particularly dangerous at certain times of the year—use of artificial clouds against spring frosts, formation of societies intended to prevent or insure against hail.

(4) It will assist the rational use of manures. It is known, for example, that lack of water in arable soil impedes nitrification. In very dry regions the extensive use of easily soluble manures may remedy this to a certain extent. In districts with abundant rainfall, where fungus diseases and storms are particularly to be feared, dressings of potassic and phosphatic manures will be increased. These same manures will induce vegetative activity in regions where winter cold and spring frosts lead to the risk of damage to advanced crops. The climatology of the country will be also utilised to fix the dates of spreading manures; for example, the application of potassic manures will be the earlier the drier the climate, that of nitrogenous manures on grass will be carried out as far as possible on dry days at the end of February when rain is imminent. Liming and marling will be done in the dry periods of autumn.

(5) It is indispensable when new crops are tried. Thus, in France, an increase in the area under sugar beet is very desirable. Before this crop is grown in certain departments, their climatology must be known; in particular, whether the distribution of average quantities of rain over the summer months will permit of the advantageous acclimatisation of this crop. Sugar is produced as much through the water in the soil as from the carbonic acid in the air. Evaporation from the leaves of beet is considerable, and may reach 350,000 to 500,000 gallons of water per acre, corresponding to a rainfall of about 20 in., which must be spread over half a year (May to October). It must be ascertained, therefore, that the rainfall can satisfy the need of this crop for water.

(6) Finally, certain meteorological data can be instanced which are of service to agriculturists, e.g., the monthly and annual distribution of rainfall and the amount of maximum falls in the case of the construction of cisterns; the system of winds in the case of the installation of a mill or an air-wheel; and extremes of temperature, duration of frosts and their intensity, in the case of heating in glasshouses.

### (b) Study of a Particular Climatological Factor, e.g., Influence of Rain in Agriculture.

Among the climatological phenomena having an important effect on agricultural production, rainfall seems to take first place, and it seems useful by way of example to study, in some detail, the role of rainfall in agriculture. The amount of rainfall is expressed in inches, a precipitation of 1 in. corresponding to 4.7 gallons of water (i.e., 47 lb.) per square yard, i.e., 22,500 gallons per acre. In France, the average quantity of rain received annually varies according to district, the minimum in the neighbourhood of Paris and the maximum in the neighbourhood of the mountains.

*Fertilising Effects of Rainfall.*—The physical and chemical effects of rainfall are well known. Minerals in the soil are rendered soluble, without which they cannot be utilised for the formation of plant tissues. It is, also, through rainfall that fermentation indispensable to plant life takes place in the soil. There is one point to which particular attention must be called, namely, the fertilising effect of rainfall due to the ammoniacal or nitric nitrogen which it contains in quantities far from negligible. Determinations carried out in France and Belgium have shown that rain contains, on the average, .0002 per cent. of ammoniacal nitrogen and .00007 per cent. of nitric nitrogen. Winter rainfall is, in general, richer in nitrogen than summer rainfall. It is seen that rain brings in an average year some 13 lb. of nitrogen per acre in the region of Paris and more than 26 lb. in the wetter districts of the country. In Germany and in Italy, the average quantity of nitrogen brought per acre by rainfall has been found to be about 10 lb., and in England about 7 lb., of which three-quarters are ammoniacal nitrogen and one-quarter nitric nitrogen, while, in the United States, it is as large as 20 lb., of which 13 lb. are ammoniacal nitrogen and 7 lb. nitric nitrogen. Rainfall is about 10 times richer in nitrates in tropical regions than in temperate climates. The proportion of ammonia is also much higher, which explains the luxuriant vegetation on certain African soils which, from their composition, would be considered as poor. These quantities of nitrogen furnished by rain are much superior to those given in manures, especially in France.

Thus, in some degree, rainfall supplies manure, but the reverse is sometimes the case, and manure can, at least in part, replace water. In order, for example, in the case of wheat, for the plant to manufacture 1 gr. of dry matter it has been established that 0.53 pints of water are necessary in unmanured soil and only 0.35 pints in the same soil with average manurial dressings. The transpiration of cereals is, in fact, diminished by the use of manures, and, varying with the dressing of the latter and the nature of the soil, the quantity of water required to produce 33 bushels of wheat per acre, weighing 71 lb. per bushel, has been reduced from 24 in. to 8 in.

*Disadvantages of Excessive Rainfall.*—(1) Potash salts are retained by the absorptive power of the soil and suffer only insignificant losses from rainfall. No loss is to be feared so far as concerns soluble phosphatic manures. It is different, however, with nitrates, which are in danger of being lost in drainage water through abundant rainfall in autumn and winter. This point must, however, not be exaggerated. The loss of nitrates in the sub-soil is much less rapid than is often imagined; thus after a rainfall of half an inch, it was found that nitrate only descended a few tenths of an inch in the soil, while the humidity produced by this rain falling on a dry soil had penetrated in one day to 2½ in. Further, in warm weather nitrate may be brought back quite quickly by capillarity from a considerable depth to the surface. Nitrate 10 in. deep in the soil was thus returned to the surface in a fortnight. During this season, capillarity causes the water in the soil to rise to replace that lost in evaporation. This water brings with it dissolved products deep in the soil, products which thus come to be concentrated in the neighbourhood of the roots of plants. Too deep a burying of nitrates following rain need not be feared when the manures are applied in spring, even if they are ploughed or harrowed in. As, however, nitrates are subject to denitrification in very humid soils, it is advisable, where too heavy rains or a high humidity are to be feared, to replace nitrates by ammoniacal manures. Sulphur, and, above all, lime, are lost through rainfall in larger quantities than any other manurial element. Losses of lime, naturally more important in a rainy climate than in a dry district, attain on the

average in France 3 to 4 cwt. per acre per annum; in very rainy years they have even reached 4¾ cwt. The practice of liming is, therefore, absolutely necessary, as lime is an indispensable element in the nutrition of plants equally with nitrogen, phosphoric acid, and potash.

(2) Soils which are too wet, i.e., which contain more than 40 per cent. of their weight of water, are, in general, impermeable to air, and thus any gaseous exchange between the soil and the atmosphere is rendered impossible. There results a stoppage of respiration of plant roots, leading to asphyxiation of the plants and a lowering of the temperature of the soil harmful to their growth. The water (which is a bad conductor of heat) remaining in the top layers of the soil is not replaced by air, and, in consequence, these layers, although superficially warm in spring, cannot transmit this warmth to the lower layers, which remain cold. There results, among other things, from this lack of warmth, the impossibility of production of carbonic acid gas in the soil, an indispensable element in the development of the plant, as a complement of carbonic acid gas in the atmosphere. Soils which are too wet lack air and are cold, but it is possible by drainage to aerate and warm them. Experiments have shown that the average temperature of a drained soil can be 6 deg. C. higher than that of an undrained soil.

(3) The substances necessary for the nutrition of plants, concentrated in the neighbourhood of the root hairs, penetrate these latter with the soil water by capillarity and endosmosis and ascend through the plant cells under the impulse of these forces. Their ascension and their absorption are considerably increased by transpiration, which leads to the consumption of an enormous quantity of water compared with that strictly necessary for the tissues. Thus fertilising elements from the soil reach right to the leaves. If the soil is too dry, transpiration is greater than absorption and plants wither, but, if the soil is saturated, the plants are "gorged" with water and their vegetative apparatus is developed to the detriment of their reproductive apparatus. In this latter case, in effect, the substances in the soil are diluted to too large a degree with liquid, and, since the roots can only absorb a certain volume of water, the plants are deprived of a certain amount of their nutrients, notably phosphates, without which it is impossible for them to live normally. On the other hand they have other nutrients at their disposal in greater quantity, particularly nitrogen brought down in the rainfall. There results an exaggerated growth of the vegetative organs, a diminution of precocity, and a marked tendency to the invasion of fungus parasites. This can be remedied by increasing the potassic and phosphatic dressings.

(4) The year 1927 showed once more that, while abundant summer rain has not always a bad effect on the quantity, it has on the quality of the crop. For wheat, in particular, it has been established that rain at harvest does not lead to the germination of the grain in the sheaf unless accompanied by a sharp fall in temperature such as is produced at the time of a storm. Such fall of temperature is not an obstacle to germination as one would be tempted to think, but, on the contrary, the determining cause. The damage to the crop is the greater the longer the temperature remains below the normal after rainfall; and inversely the damage is the smaller the more rapidly the thermometer regains the average for the season. In regions where rainfall is abundant during the months of July and August, it is to the interest of farmers to select varieties of wheat which are resistant to this special effect of summer rains.

## Correlation between Rainfall and the Yield of Wheat.

The preceding considerations show the important part played in agriculture by rainfall. It has long been known (it is found for instance in the Bible) that harvests are intimately dependent on rainfall. For the central region of France, in particular, the following rules have been drawn up on the relation between rainfall in the quarter April, May, June and the yield of the wheat crop:—

(1) If the rainfall during these three months is below average, the yield will be above average so long as the temperature is not more than 1 deg. C. above the average. If the temperature is more than 1 deg. C. above average, the crop is damaged by burning.

(2) If the rainfall during these three months is above average, the yield of wheat is below average.

Analogous conditions have been found in the north of Italy and in Ohio, where a diminution of rain in the spring is accompanied by an increase in the yield of wheat. On the contrary, in the south of France and the southern part of the Italian Peninsula, the effect of rainfall is quite the opposite.

## III. RADIO METEOROLOGICAL INSTALLATION OF AN AGRICULTURAL HOLDING.

The preceding considerations suffice to show the importance for the agriculturist on the one hand of the reception of short-term weather forecasts, and on the other of a knowledge of climatological elements not only for his region, but also for the precise spot where his holding is. He can thus take account of the repercussion of atmospheric factors on his crops and seek for means to diminish the disastrous effects of certain of them.

It is indispensable in the first place that wireless receiving sets should be multiplied in country districts, for agriculturists can thus receive, beside the regional weather forecasts sent out each day at a fixed hour, special warnings of atmospheric conditions favourable to the development of fungus diseases, of spring frosts, or of particularly violent hailstorms.

In the next place, every important holding should have besides a barometer, the variations of which will complete the forecast data, a small meteorological installation comprising several simple pieces of apparatus which stand rough usage, which cost little, and which give sufficiently precise data. Until 1927, such instruments did not exist. This regrettable gap has now been filled by the National Meteorological Office on the demand of a seed selection society in the Paris district which desired to possess a meteorological station; and at the present time agricultural meteorological "posts" on that Office's model are being multiplied throughout the country. The installation comprises:—

(1) A screen of very small dimensions containing maximum and minimum thermometer, psychrometer* and evaporimeter.

(2) A rain gauge.

(3) An actinometer for the determination of the intensity of solar radiation, and sunshine recorder.

(4) An outside evaporimeter to determine evaporation at the level of the plant.

(5) A maximum and minimum thermometer placed a few centimetres above the soil in order to obtain the temperature at the soil level.

(6) A soil thermometer to measure the temperature at 40 cm. depth.

(7) Three special soil thermometers to determine the temperature of the soil at depths of 30 cm., 60 cm., and 1 metre.

The whole of this apparatus costs about 1,500 francs (at present, £12), but for many agriculturists a smaller installation would be sufficient; that employed in the Department of Seine-et-Oise, with the collaboration of the Meteorological Commission of that Department, may be instanced as especially interesting. On a dozen holdings there has been installed a meteorological "post" comprising only a rain gauge, outside evaporimeter, maximum and minimum thermometer to measure the temperature of the open air at a few centimetres above the ground, and a soil thermometer at 40 cm. depth. A meteorological post, composed of these four pieces of apparatus, gives very complete information on the temperature of the air and the soil in the layers affecting plants, as well as of rainfall and evaporation—which are two phenomena which ought not to be separated. The price is only 200 francs, since rain gauges are generally lent free by the Departmental Meteorological Commissions to persons who express the wish to have them, the only condition imposed being that they undertake to carry out observations regularly every day and forward a summary every month.

*A combination of two thermometers, the bulb of one of which is coated with muslin kept moist with water. The difference in the readings is used in the calculation of the humidity of the atmosphere.

*A PRACTICAL HANDBOOK.*

*Thus a Columboola farmer:—"Keep on sending me the Journal, for which I enclose 3s. as subscription for another three years. I regard the Journal as a useful and practical handbook.*

# THE CULT OF THE COLT.*

By "U 9 L."

IV.

## DRIVING—LEADING—MOUNTING.

We've handled the colt to our heart's content, and perhaps bored him with our ceaseless attentions; we've picked up his feet repeatedly till the poor chap's doubtless wondering what it's all about, and on the near side and the off have we moved freely till the colt doesn't know which way we're coming at him. We've led him about till he almost regards himself as part of our shadow, and between us we've formed a bond of friendship. Now we'll drive him in reins. Some people prefer the roller for this, running the reins through the rings on it, but I fancy the old saddle once more. You see, the saddle is his companion for life, and he's got to get used to it. If you tie a strap loosely under his belly, each end of that strap attached to a stirrup iron on either side, that will keep those irons in place. And if you run your driving reins through those irons it keeps the reins down and serves even better than the rings on the roller. See? And though it doesn't serve any special useful service, it's not a bad plan to have those same old flapping bags decorating the colt even while we drive him in reins. It all helps to civilise him. Let's drive him.

Some breakers like great long reins, things reaching from here to there. I don't know why, but many of them do. I like reins as short as they may be so long as they allow me room to stand well clear of the colt's rearguard attentions, should he have any inclinations in that direction. You see, those reins are a dead weight on the colt's mouth. The longer they are the heavier they are. No matter how lightly you try and handle him, with those long reins, it's a leaden drag on the youngster's jaw, and that isn't good for his future perfection, if he is to have any. However, take your choice. I've known breakers drive their colts all over the place, through gates, into the garden, round by the stables, under the clothesline, and up to the kitchen door. I've heard that acclaimed, too, as being the mark of the good breaker. It's certainly painstaking, if nothing else. In fact, I'm prepared to say without reserve that it creates a good impression in over 90 per cent. of cases when a breaker drives his colt good and plenty. I'll go further than that and state it creates too good an impression—on the colt! It doesn't matter how light you may be in the hands, or what delicacy of touch is yours, you can't preserve that daintiness over a long length of driving rein. I've seen, and so have you, a breaker driving his colt about the house, looking round with that self-satisfied smirk so apparent in many men, and veritably he's longing for someone to step out with a camera. And all the time there's nearly half that 30 feet of driving reins dragging on the ground. Tell me, and be impartial when you make judgment, is that sort of thing conducive to a light mouth in a colt? And then tell me if you regard a light mouth as a thing to be desired. When I say "light" I don't mean giggle-headed, please bear in mind. "Light" means responsive, which is, or which should be, the point at which we aim. Having said that much, you'll now be prepared for me to make the revolutionary statement that I don't believe in excessive driving in reins. I don't! I'll do a few figures of 8, teach the colt to stop and start a few times, and I'll undertake to say I won't spend more than a quarter of an hour on the driving process, not wasting one minute of it, and I'll do my mouthing, and do it lightly, when I'm on the thing's back. I have finished, even though I've told you more of what I dislike than of what is to be done.

### Be Prepared for Quick Action.

Now, straight on top of his driving, and while the impression is still fresh on him, we'll lead our colt on horseback. This has to be done some time, and the advantage of doing it before we ride him is to accustom him to a man being on top of him, if only by proxy, as it were. This is where the work of our old coacher is necessary, and this is where that wise old horse, having an inkling of what is coming, tries to hide himself or play some other trick in an attempt to dodge his work. From the horse's point of view, it's a rotten job. We leave the old saddle and all the other gear on the youngster, and in place of the bridle we slip a halter on his head. Then we pull him up beside the coacher, on the off side of him, of course, and pass the shank of the halter under the coacher's neck. Bear that in mind, will you, as it gives you an added leverage out of all proportion to what it would appear to make.

* From the "Pastoral Review" for June. Previous notes on this subject, by the same interesting and well-informed writer, were reprinted in the March, August, and October (1928) Journals from the February, April, and May (1928) numbers of the "Pastoral Review."

Take the shank under your coacher's neck from the off and bring it up his near side to where you'll take it in your hand. As soon as ever you swing on the old horse the youngster will bound away. He can't help it. He's not used to having a mounted man right on on top of him, and he's not yet accustomed to us appearing from nowhere all of a sudden. That's just hinting delicately it's a wise move to be prepared for quick action as soon as you swing on the old horse, and also to be brisk in changing and holding the shank.

**Five Minutes' Fight.**

But, bless you, that colt isn't frightened for long—not if our other work on him has been good, anyway. He'll strain back a bit, prick his ears, look up at us and snort. But he'll soon know it's a friend he's used to who's on top of the coacher, and though he mightn't come willingly he'll come to you if you've taught him good work in the leading exercises. Away you go. You don't! As soon as you move on the coacher the colt tries to pull away. Bear in mind, will you, that the whole of the colt's life to the present has been one incident after another to teach him to run from a mounted man. You've got to break down his instinctive dislike, his life's training, and his desires—that's the little task waiting you in teaching a colt to lead on horseback. The wonder is, really, that a man can do it at all. But after two bits and a little more that colt comes confidently to the side of the old horse, and if you do your work well and with judgment and tact it's running freely beside you, extending the glad hand of friendship as it does so. Five minutes' fight, ten minutes' pride and pleasure—that's the first lesson epitomised. You lead him round the big yard, out in the open if you wish—though I always leave that till later, and then you have him standing beside you. This, apart from teaching to lead, is the real object of the first lesson.

As the colt is standing beside you, and moving your old coacher over on to him as he tries to edge away, you lean over the youngster and rest some part of you, if it's only your hand, on his saddle. Gradually you become more familiar and lean right over, slapping him down the ribs on the off side, and then you lift your right leg free and throw it over the colt's back. He mightn't take all this lying down and in an even spirit. But you're on top of the old horse, you're safe, and all you're trying to do is to let the colt know that it's quite the proper thing for a horse to have a man on top of him, that it's done in quite the best circles, and that you're merely introducing the thin edge of the wedge of horsemanship. You keep adding familiarity to intimacy, and shortly the colt doesn't mind what you do, so long as you do it quick and keep within the bounds of reason. Our object achieved, we take him to the round yard again and prepare for the next lesson.

**Use of Martingale Condemned.**

This time when we take off the old saddle, it and the colt may kiss each other a last farewell—they're divorced for ever. We put on our proper saddle now, one with good gear all through, and we're particularly careful as we saddle him that the thing rides right, that the girths are as they should be, and that the crupper is just so. Part of the breaking process is that a colt must stand a crupper, and though it may never be used again it's got to go on regularly while he's attending school. A breastplate's not a bad idea, though I see little use in it if a horse is shaped within reason at all, and I won't hold with a martingale. No, sir! If a man's hands are so bad that he can't keep a horse's head down then it's better for him to go and play marbles than get in his own road and spoil better horses than he is a man. That's my idea, which may, or may not, be right. A martingale destroys the delicacy of touch, forces a horse's head in an unnatural position, and in its own way it also destroys a rider's hands. Thanks, all the same, but I'd sooner not have one if you don't mind. A man may please himself about single or double reins on his bridle, about the type of surcingle and other portion of his gear. There's only one axiom: let them be strong and clean, and there are a dozen maxims which laud simplicity.

**Use of Spurs Evidence of Bad Horsemanship.**

Spurs? Positively and finally, once for all and for ever, No! Spurs may, or they may not, be necessary at some later stage of the colt's life. But the man who dons spurs when first riding a colt is a fiend, an idiot, a murderer in embryo, and a thing unfit to mix in decent company and with horses. Honestly, I don't know why a man should ever use spurs. That is, provided he always rides his own breaking. To a horse accustomed to spurs, they're more or less necessary, particularly on a cattle camp, but for ordinary work, and a man riding a horse which is his for a number of years, then I always look on spurs as being a reflection on the lack of horsemanship of the rider. We'll have another word of two to say about those abominations later. Now we'll get on with the colt.

**Prepare to Mount!**

In what yard are you going to mount him? We each have our individual fancies, and I prefer the big yard. The only reason I take the yard at all is because the colt isn't yet mouthed properly. I've never yet mouthed a reputedly bad horse to ride it in a yard, preferring the open, and for the same reason I like as much space as possible round me when I get on the colt. Let's mount. The youngster is standing there, so burdened with new experiences that its brain's in a whirl and its content to take whatever might come next, accepting it as part of the regular routine. After putting the reins over its head the first thing to do is to follow the golden rule: stand in close. Get in till you're hugging its shoulder with your body, gather the reins in your hand, not too tightly and yet so you have command of them, place your foot in the iron, your knee in its shoulder, a grip of the pommel, and on you swing in one movement, and not in a jerky progression of uneven propulsions. Come back and do that over again, will you? This isn't any attempt to break the speed record. This is a steady mount we're practising. We want to accustom the colt to us climbing on his back, and we want to do it as carelessly as possible while yet preserving a margin of safety for ourselves.

## SOME USEFUL TREES.

Here is a brief list of useful shade and fodder trees of value to the stockowner:—

Wilga (*Geijera parviflora*).—A small tree widely distributed in western areas, especially on red soils and heavy alluvials. The trees are shapely and ornamental, being usually trimmed round the bottom by sheep. They make excellent shade trees, and are very hardy and drought-resistant.

Rosewood or Boonery (*Heterodendron oleæfolium*).—A small to medium sized tree, but sometimes little more than a shrub. At times there is a danger from poisoning, especially when the leaves are wet with dew or rain. Very hungry sheep should be fed with caution, and if possible other material fed as well. Some cutters adopt the practice of lopping a day before feeding, thus reducing the risk of hoven.

Kurrajoing (*Brachychiton populneum*).—This is without doubt the most popular tree with landowners in the western division, being extremely useful as a fodder tree and providing in addition good shade and shelter. Owing to its deep rooting habit crops may be grown practically to the base of the trunk. Propagation from seed is not difficult.

Belah (*Casuarina lepidophloia*).—A useful fodder tree, although the woody and somewhat astringent branchlets have sometimes a bad effect, particularly if fed without a mixture of more succulent species. A useful shade, shelter, and ornamental tree.

Supple Jack (*Ventilago viminalis*).—A small to medium sized tree with a 30-ft. height, which generally shows a preference for light drift soils or sandy loams. Often a rather poorly-shaped tree with sparse foliage, but becoming much more dense after lopping. It suckers freely, and is regarded as a most useful fodder tree, some pastoralists ranking it with Kurrajong.

Whitewood (*Atalaya hemiglauca*).—A small to medium sized tree with a scaly and friable bark. This tree, especially if pruned, is of ornamental appearance, and provides a certain amount of shelter. It is frequently used as a drought fodder, but recently investigations have shown that it is poisonous to horses, although apparently not affecting other stock.

Wild Orange (*Capparis Mitchelli*).—A small tree or large shrub, often of bushy and spreading habit, and found chiefly on clayey loams. The larger trees provide very useful shade and shelter, forming an attractive, rather dense growth, and they are ornamental in appearance.

Quandong (*Fusanus acuminatus*).—A shrub or small tree. The fruit is edible, and is often much sought after. Useful as an ornamental or small shade tree, and with some value as a fodder.

Gruie or Colane (*Owenia acidula*).—A small tree with a milky juice, frequently found on sandy ridges. The tree is very ornamental, provides good shade, and is useful as a fodder.

Wild Lemon (*Canthium oleifolium*).—A shrub or small tree, confined mainly to red soils and sandy ridges. It provides fair fodder during droughty periods. Sometimes known as Myrtle tree.

# General Notes.

## The Quality of Queensland Bananas.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) informed the Press recently that reference had recently been made to the quality and quantity of bananas produced in this State, and that mention had also been made of the economics thereof. In connection with these matters the Minister stated that a great deal of attention and assistance had been given to this industry by Departmental officers. A very material increase has taken place in both the area of land under banana cultivation and in the quantity of fruit produced since the import duty had been imposed, and it is for growers to recognise that the continuance of the duty demands that their product must be satisfactory both in size and quality. An attempt was made to prevent undersized bananas being exported, and, under regulation, grade standards were prescribed, but a difficulty had been met in the enforcement of the standards of bananas intended for the interstate trade as the application of grade standards conflicts with section 92 of the Constitution of the Commonwealth. With a view of protecting the bananas from frost, many growers have selected land on the top or slopes of hills where the soil is not all that could be desired for banana production. In many cases this soil has rapidly become impoverished, and has failed to grow bananas of satisfactory size and quality. There has also been a rigid adherence to the Cavendish variety of banana, and while this variety had much to commend it, it does not produce such a large fruit or carry so well as the Gros Michel, which is worthy of greater attention by growers.

An examination of ripening arrangements indicated that the methods followed in the maturing of fruit are not in accordance with the best modern practices, and the result is that the fruit is not presented attractively for sale. To these phases of the industry increased attention must be given in the immediate future.

He had no doubt that much of the propaganda against the Queensland banana industry was inspired by vested interests in the South, and by merchants who desire to introduce a policy of free trade in the particular lines of commerce in which they are engaged.

## Agricultural Project Clubs.

It is as well that we should remember that the success of a club is determined not by the number of members, but rather by the *work* done by the members. Interest in the work, knowing why a thing is done, the introduction of labour-saving devices, record keeping, costing, &c., are the things that count. For instance, there is little use in having charcoal in a sty if the member does not know why it is there. The child member of a club should be able to answer questions concerning his work, and if he is in charge of a pig then, as a pig club member, he should know its starting age and weight, its breed, its approximate weight and value at the time of the home visit, the increase it is making per day, the points of a good bacon-pig, and wherein his animal falls short of the standard; he should be able to estimate the dressed weight from a given live weight, and know the price of a baconer over the scales.

In regard to the marketing of his animal he should know the weights of a prime baconer (95-120 lb.)—i.e., the weights that command top price, who sets this standard, and the reasons for it. It would be as well to point out to the club member that the weights that command top price vary; for instance, in New South Wales the weight is 105-130 lb., in Victoria 110-135 lb., while in other countries 200 lb. is the standard. He must realise that, if he is to be successful, he must study the requirements of the market.

A meeting of each club might be reserved for a discussion on "Time saving and making farm work easier." The child only needs a start in that direction. If he commences to think on such lines regarding his club work, he will apply the idea to his school work, and later to his work in life.

A school period might be set apart for club work, and the work done entered in the Work Book. In the Work Book under the heading of Club Work might appear entries such as "Explanation of marking system," "Building of sty and run," "Rations for feeding," "Value of record keeping." During this period the child should be encouraged to take the lead in all discussions. The Club Meeting could be held once or twice a month during school hours, the members electing their own chairman and secretary. The subject for discussion should be fixed some time ahead, so that children will have ample time to collect information.

The teacher should occasionally take a leading part in the meeting, giving a short address on record keeping, costing, and the value of saving time on a particular work by quicker methods or by the use of labour-saving devices. He could then invite the members to think the matter over in connection with their club work and try to put the ideas into practice. Members could be given the opportunity at a later period of addressing other club members, telling them of the labour or time saving device they have employed.

Non-Club Members of upper classes could be permitted to take part in these meetings. They may be interested in the work; often the fact that they are not active members is due to circumstances over which they have no control.

Club Work may be correlated with the Mental Arithmetic, Composition, and Geography lessons.—"Education Office Gazette."

## Canegrowers' Defence Fund Levy.

Following is the result of recent referendum on this question:—

| | |
|---|---|
| Against the levy .. .. .. .. | 1,522 votes. |
| For the levy .. .. .. .. .. | 1,424 votes. |
| Majority against the levy .. .. | 98 votes. |

The levy was to be credited to the Queensland Cane Growers' Council Defence Fund. The proposal now lapses.

## A Beautiful Prayer.

"Thou, O Lord, providest enough for all men with Thy most bountiful hand. But whereas Thy gifts are made common to all men, we through our selfishness do make them private and peculiar. Set right again that which our iniquity hath put out of order. Let Thy goodness supply that which our meanness hath plucked away. Give meat to the hungry and drink to the thirsty; comfort the sorrowful, cheer the dismayed and strenghten the weak; deliver the oppressed and give hope and courage to them that are out of heart. Have mercy, O Lord, upon all forestallers, and upon all them that seek undue profits or unlawful gains. Turn Thou the hearts of them that live by cunning rather than by labour. Teach us that we stand daily and wholly in need of one another. And give us grace by hand and mind to add our proper share to the common stock."—From "Queen Elizabeth's Prayer Book."

## Cotton Board.

An Order in Council has been approved providing for six representatives of growers on the Cotton Board instead of five representatives as previously. The State has accordingly been divided into six districts, from each of which one representative will be elected. The six districts are—

*District No. 1.*—Comprised of areas served by the railway stations north of Bundaberg to Rockhampton, the Boyne Valley Branch excepting Barrimoon and Kalpowar, beyond Rockhampton to Emu Park and Yeppoon, beyond Rockhampton to Westwood on the Central Line, and all lines and branches north of Rockhampton.

*District No. 2.*—Comprised of the areas served by the railway stations from Boongarry to Mount Morgan and Muruguran and the Central Line and branches west from Westwood.

*District No. 3.*—Comprised of areas served by the railway stations from Rannes to Theodore and from Rannes to Thangool, inclusive.

*District No. 4.*—Comprised of areas served by the railway stations on the North Coast Line from Mungar Junction to Bundaberg and branches thereof (including the Gayndah Branch), and Barrimoon and Kalpowar on the Boyne Valley Branch.

*District No. 5.*—Comprised of the areas served by the railway stations on the North Coast Line from Brisbane to Antigua and branches (including the Nanango-Tarong-Proston and Windera Branches), Brisbane to Grandchester, and all branches between those stations including the South Coast Line and branches and Cleveland Line.

*District No. 6.*—Comprised of the areas served by the railway stations from Laidley to Toowoomba and Branches on the Southern and Western Line and all branches beyond Toowoomba, Western Line and Branches beyond Toowoomba, Southern Line and branches beyond Toowoomba, and South-Western Line and branches beyond Toowoomba.

Nominations will be received until 17th January, 1929, as Growers' Representatives on the Board until 31st December, 1931, and each nomination must be signed by at least ten growers in the district concerned.

**Talagai Holding—A Correction.**

By an Order in Council dated 16th August, 1928, "Talgi Holding," near Capella, was declared to be a sanctuary for animals and birds. This should have read Talagai Holding, and an amending Order in Council has now been approved.

**Carriage of Bananas to Railway.**

Regulations have been approved under "*The Fruit Marketing Organisation Acts, 1923 to 1928*," providing that bananas for carriage to railway station, siding, or other place of railway despatch, shall be carried either in—

(*a*) A vehicle specially constructed and used for such purposes only and so fitted and kept as to protect any such bananas from rain and sun or contamination by dust or other means; or

(*b*) A vehicle provided with a dust-proof and weather-proof covering such as a tarpaulin or similar contrivance, which covering shall only be temporarily opened or removed for the addition of further loads of bananas en route or on arrival at the railway.

A penalty of £20 is provided for a breach of this Regulation (No. 165).

**School for Project Club Members.**

A school of not more than twenty boys who have done successful work as members of State Schools' Agricultural Project Clubs will be held at the Queensland Agricultural High School and College from the 28th January to the 9th February, 1929.

Applicants for enrolment in the school may be members of calf, poultry, pig, or other clubs. Railway passes will be granted by this Department to the boys selected to attend the school.

Head teachers are requested to bring to the notice of the Club members in their schools the fact of the projected holding of the school, and to invite applications from members of their clubs. They are then requested to consider the applications and note against each applicant a summary of his claim to selection. They should forward the names of the applicants before the 28th November, and accompany them by a recommendation as to the boy whom they would recommend for admission as their school's representative in the school.

A course of instruction in Agriculture will be afforded the members of the school, the work undertaken including talks and demonstrations in Animal Husbandry, Agriculture, Dairying, and Elementary Science. A feature will be made of such items as the necessity for having the most efficient animals and plants on farms; the benefits arising from Herd Testing; the importance of Weed Control and Moisture Conservation in Queensland farming; illustrations of the methods of decreasing costs of producing crops and stock by proper farm management; the various breeds of stock; methods of feeding; balancing rations for farm stock. Opportunity will be taken also to show as much as possible of the various processes such as butter-making, cheese-making, ice cream-making, and so on.

**Staff Changes and Appointments.**

Messrs. M. J. Cross and A. C. Euston, of Glastonbury, via Gympie, and Mr. N. L. Miles, of Zillmere, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

Messrs. M. P. W. Button, A. J. McCullough, R. F. Hobler, and A. Cowan have been elected Members of the Windorah Dingo Board, and Mr. J. A. Kidd, of Windorah, has been appointed Government Representative on that Board.

Messrs. J. T. Barnes, J. Drynan, C. J. C. Philp, and R. Woods have been elected Members of the East Moreton Dingo Board, and Mr. J. T. Yore, of Glenmore, Beaudesert, has been appointed Government Representative on that Board.

Mr. J. A. Weddell, Assistant to Entomologists, has been appointed Assistant Entomologist, Department of Agriculture and Stock, as from 6th October, 1928.

The resignation of Mr. N. Devine, of Chudleigh, Daymar, as Honorary Inspector of Stock, has been accepted as from 1st January, 1929, as tendered.

The appointment of Mr. L. A. Downey as Assistant Instructor in Pig Raising has been confirmed as from 5th June, 1928.

Messrs. F. G. Connolly, Assistant Instructor in Fruit Culture, and W. Jost, Inspector of Slaughter-houses, will be retired from the Public Service as from the 30th June, 1929.

Mr. A. McGregor Henderson, Redland Bay, has been appointed a Member of the Arrowroot Board until 14th April, 1931, vice Mr. P. P. Outridge, resigned.

## MEASURING THE FLOW.

An inquiry from Beech Forest (Vic.) with reference to the measurement of the flow of streams so as to ascertain the amount of power available shows that hill country residents are waking up to the stored-up energy lying at their feet. A minimum of five-horse power may be taken as sufficient to justify an instalment for converting this power into work. This can be obtained from about 250 cubic feet of water per minute falling from a height of 10 feet, or 50 cubic feet of water per minute falling from a height of 50 feet. The power of small streams may be measured in a simple and sufficiently accurate way by anyone who can use carpentering tools. A temporary dam of sandbags, logs, or stone and earth should be placed across the stream at right angles to the flow, leaving room in the centre for the measuring notch or weir (Fig. 1). The width and depth of the opening in the weir is determined by the size of the stream, and can be ascertained by experiments with a rough model. It should be large enough to allow all the water to flow through the notch, and small enough to cause a still water pond to form for several feet behind the weir. For obvious reasons the measuring should be done in summer time, when the amount of flow is at its lowest. The stream running down from a higher level empties into the pond, which in turn should be emptying itself through the opening in the board at the same rate as the stream is keeping the pond full. This weir

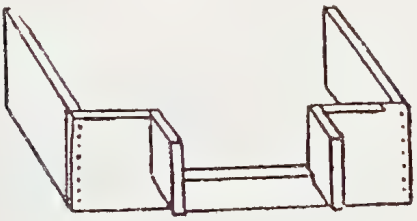


Fig. 1.

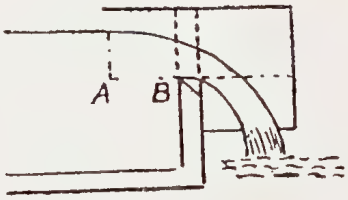



Fig. 2.

should be set at right angles to the flow, upright, and perfectly level. It must be built into the embankment, and into the bottom of the stream, so that no water can escape except through the opening. Fig. 2 shows a cross-section from which it can be seen that the lower edge of the notch is cut on a bevel with the sharp edge upstream. The wings on either side of the notch prevent the stream from contracting as it flows through the opening, which would upset the calculations. The depth should be measured at the point A (Fig. 2) back from the opening, where the water is at a dead level, and moving slowly. Every square inch of water flowing through the opening indicates approximately 1 cubic foot of water per minute. Thus, if the opening is 12 inches wide, and the water flowing through is 6 inches deep at A, 12 x 6 = 72 square inches of water, indicating 72 cubic feet per minute. With a fall of 37 feet through a pipe to a turbine this would develop about five-horse power —72 x 62½ (weight of 1 cubic foot of water) x 37 = 166,500 lb. of continuous pressure, practically equal to the work of five horses. Theoretically, a horse performs 33,000 feet lb. of work per minute. This method would be sufficiently accurate for an engineer to determine whether it would be worth while installing a turbine on a small stream—"Australasian."

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### WEANING THE BABY.

When a mother thinks of weaning her baby there are four points which she should take into consideration—

(1) The age of the child.

(2) The time of the year.

(3) The time required for weaning.

(4) The method of doing it.

#### The Age at which the Child should be Weaned.

The best time to wean baby is between the age of nine and twelve months. Up to that time his sole food should have been his mother's milk and, unless for urgent reasons, baby should never be weaned before that. The younger the baby is the greater are the risks that attend the process. Thus, a baby four or five months' old is much more likely to become upset or ill if weaned than one eight or nine months. If baby is less than nine months old when weaned, he should be given a feeding bottle, but if over that age it is better to teach him to drink out of a cup, or to use a spoon. If baby has been bottle-fed, when weaning time comes give him his food out of a cup instead of the bottle at first for one feed only during the day, so accustoming him to the change. Then later give the cup for two feeds, and the bottle for the remainder of the day, and so on.

Some mothers think that if they give a bottle feed instead of a breast feed in baby's early months, they will, in this way, make weaning easier. This should not be done. What they almost always achieve is the unnecessary early weaning of the child, for by substituting a bottle feed for a breast feed the mother's milk will diminish. Drinks of boiled water may be given to a young baby from a bottle, but a full feed should not be given while baby is on the breast.

#### When to Wean the Infant.

The second point is the time of year. Always, if possible, avoid weaning in very hot weather. This is sometimes difficult because Queensland has a long summer. If baby must be weaned during hot weather avoid the worst months. Here the worst months are probably not the hottest, but those during which dysentery or summer diarrhoea (gastro-enteritis, as it is often called) is prevalent. Every summer this disease appears and makes many babies ill. It appears early in summer, and is at its worst in November and December. For this reason, these are the most dangerous months for weaning baby. If he reaches nine months during this time, postpone weaning at least until January and then go very slowly and carefully.

Babies kept wholly on the breast until about fifteen or sixteen months old—i.e., until the cooler weather comes—are often very difficult to wean. Not infrequently they refuse absolutely to take other foods. The older the baby the more difficult he is to wean.

#### The Time Required for Weaning the Baby.

The third point is the time required for weaning. Unless absolutely unavoidable, the change from natural to artificial feeding should never be sudden. The mother who quite suddenly substitutes the one for the other doubtless does it with good intention, but it is an unkindness to the baby. The change from complete natural feeding to complete artificial feeding should never be made in less than two weeks; preferably take five or six weeks.

**Method of Weaning.**

The following is a practical plan for weaning after nine months. We will assume that the baby has been fed four-hourly, i.e., at 6 and 10 a.m. and 2, 6, and 10 p.m., so getting five feeds daily.

First Change.—Give baby oat or barley jelly by spoon at the 10 o'clock feed. Begin with one tablespoon of the jelly and give two or three teaspoons of cow's milk on it. Follow this by the usual breast feed and give breast feeds as usual for the remainder of the day. Do this daily for a week and make no other change during that time. A crisp crust may be given once or twice daily before feeds throughout the weaning period. Give it to him when he is hungry. About ten minutes before his feed is due, not between feeds.

Second Change.—Omit breast feeding at 10 a.m. Give instead first the oat or barley jelly, which may be gradually increased to two or three tablespoons, and follow this by about 6 to 8 oz.—about an ordinary cupful—of milk mixture. Make no further change during this second week. Pure milk should not be given to begin with; it is better to commence with about three parts milk to one of water and gradually increase to full strength.

Third Change.—Give the breast every eight hours—i.e., at 6 a.m., 2 p.m., and 10 p.m. Give oat or barley jelly at 10 a.m. and 6 p.m. followed by the milk, as in change 2. Do this daily and make no further change this third week.

Fourth Change and for the 4th week.—Give the breast at 6 in the morning, and 6 at night. At the other three feeds, give the milk mixture. Give oat or barley jelly at 10 a.m. before bottle, and at 6 p.m. before breast.

Fifth Change and for the 5th week.—Give the breast once only; at the 6 a.m. feed. Give milk mixture for all other feeds. Oat or barley jelly before 10 a.m. and 6 p.m. feeds.

Sixth Change and for the 6th week.—Discontinue giving breast at 6 a.m. Give milk only.

Baby is now entirely weaned, and it is probable that it has been achieved without his realising that any change was being made.

After weaning is completed, care is still required to establish the baby on suitable food. He should certainly not be allowed to share the family meals, and eat scraps of everything.

Remember that at this stage food tastes and habits are formed which may last a lifetime.

**Important Points to Remember.**

The following important points should be remembered by the mother:—

1. Teach baby to drink out of a cup at any time between nine and twelve months (if this has not already been done, and provided he has cut two teeth), and discontinue bottle feeding. Give the drinks from a cup, first at one feed (say, the 10 a.m.), then at two feeds in the day, and so on, thus discontinuing bottle feeding gradually.

2. Keep absolutely to regular meal times. Give nothing whatever but water and fruit juice between meals.

3. As baby takes more solid and varied food he needs less milk, but do not let him go without a drink at each meal. A healthy baby at this age can usually take pure cow's milk. Up to eighteen months milk in some form should be his principal food.

4. Introduce all new foods one at a time and a little at a time. Never make sudden changes. It is better to go too slowly than too quickly.

5. Teach baby to eat each new food that is good for him. Do not let him start the bad habit of refusing food because he does not like it. If persevered with, babies like almost anything that is good for them. They will not want the things which are bad for them if they have never tasted them. Do not let them get the taste for cakes and sweets.

6. Active exercise for teeth, jaws, and salivary glands is absolutely necessary. Baby must be taught to chew, not to bolt his food, and, as time goes on, to take more and more of his food in hard form. Remember that toast or crusts, with butter or dripping and a drink of milk, are just as nourishing and better for teeth and digestion than a basin of bread and milk.

7. Do not add too much sugar to baby's food. It is bad for the teeth and the digestion.

8. Cook all foods thoroughly and serve appetisingly. Add a little salt in cooking.

9. Children should not be continually urged to eat if they are disclined to do so. Under no ordinary circumstances should a child be forced to eat.

10. If there is any important article of a simple diet, such as milk, meat, cereals, or vegetables, which a child habitually refuses, this should always be given first at the meal, and all other food withheld until this is eaten.

11. Always give the most substantial meal in the middle of the day. Never give a young child a meal of meat and vegetables before he goes to bed at night.

**Baby Foods.**

The following foods may be given to baby, between the end of weaning and twelve months:—

More cereal jelly, slowly increasing up to 10 oz. daily. More crisp crust and toast; more fruit juice.

From twelve to fifteen months a considerable increase may be made in the diet, always remembering to give new foods one at a time and a little at a time.

Give more solid, dry, and hard foods, such as crusts, baked bread and toast, all to be taken with a little butter or dripping. Sweet biscuits should not be given. They are made from finely ground flour, which form a paste which lodges in the crevices of the teeth, where it is liable to set up fermentation and decay. Cereal jellies to be continued; towards the end of the time gradually mix some unstrained porridge into the jelly and, as time goes on, less and less need be strained. Give milk puddings, made with well-cooked ground rice or semolina. At this time a little egg may be given; perhaps half a yolk two or three times a week. Gradually introduce a little white. Give vegetable milk-broth, chicken broth, or mutton broth. All to be made with pearl barley or rice and to be well strained.

Vegetables.—Floury potato cooked in skin, spinach, cauliflower, carrot, &c., well cooked, rubbed through a fine sieve, and served warm with a little butter or meat gravy without fat.

Fruits.—Pulp of baked apple, or pulp of stewed prunes. Begin with only a teaspoonful and increase very gradually to one or two tablespoons. A little milk may be given with this. Gradually and cautiously some raw ripe apple may be given.

From 15 to 18 months.—Feed on same lines as for previous three months, but give more solid hard foods, including wholemeal bread, and milk puddings made with rice, sago, &c. Give a piece of raw ripe apple at the end of each meal. Continue training baby to chew thoroughly, and avoid giving much soft, mushy food. An egg, lightly boiled, may be given, but not more than three times a week. Light fish, steamed or boiled, may be given; also chicken, steamed or boiled and either well minced, or preferably chewed off the bone. Only a teaspoonful of either fish or chicken should be allowed at first, and the quantity very slowly increased.

An important point for the mother to remember during this period is that, though baby's first teeth are only now being cut, the second set of permanent teeth are forming in the gums. Their strength and durability depend very largely on the foods given, and the amount of work done by mouth and jaws at this time.

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## PRICKLY-PEAR—PREVENTION OF FURTHER SPREAD.

The Prickly-pear Land Commission, which took up duty in April, 1924, issued a statement setting out the policy which it was intended to pursue. Portion of that statement read as follows:—

"To clear Queensland of prickly-pear is at present quite impossible. The cost of the first clearing alone, even if practicable, would probably exceed £100,000,000. It is not to attempt the impossible, but to stop the further spread of pear, to do justice to the holders of pear lands, to encourage and reward their efforts in clearing, to make uniform and consistent and generally improve the administration of pear-infested lands, that the Commission has been appointed."

Four years have elapsed since the aim of the Commission was so stated, and the Commission in its annual report states that, except in the northern portion of the Commissioners' territory where the country is used solely for grazing cattle, the returns from which have not warranted heavy expenditure in pear-clearing, the further spread of pear has been definitely stopped.

There is considerably less pear in Queensland to-day than when the Commission took office, and the further spread of this pest has been effectively controlled.

# Orchard Notes for February.

## THE COASTAL DISTRICTS.

February in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smooth leaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half-coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can; but smaller fruit, that must not be less than 4 in. or, better still, 4¼ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over-ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyanidings, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries may be planted towards the end of the month, and, if early ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a way that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts winemaking will be in progress. Here again care is necessary, as the better the condition in which the fruit can be brought to the press the better the prospect of producing a high-class wine.

Where necessary and possible citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

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# Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description, suitable for coastal districts and localities where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the Setaria family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to Planters' Friend (so-called Imphee) and to Orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a density of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In most agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of one pint of formalin (40 per cent. strength) to 24 gallons of water should be made up, and the potatoes immersed for one hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish Blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

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# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

### AT WARWICK.

| | January, 1929. | | February, 1929. | | MOONRISE. Jan., 1929. | MOONRISE. Feb. 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | p.m. |
| 1 | 5.1 | 6.49 | 5.26 | 6.46 | 11.14 | 11.14 |
| 2 | 5.2 | 6.49 | 5.26 | 6.45 | 11.43 | 11.47 |
| 3 | 5.3 | 6.49 | 5.27 | 6.45 | ... | 0.0 |
| | | | | | a.m. | a.m. |
| 4 | 5.3 | 6.50 | 5.28 | 6.44 | 12.13 | 12.23 |
| 5 | 5.4 | 6.50 | 5.28 | 6.44 | 12.43 | 1.5 |
| 6 | 5.5 | 6.50 | 5.29 | 6.43 | 1.15 | 1.53 |
| 7 | 5.6 | 6.51 | 5.30 | 6.42 | 1.48 | 2.43 |
| 8 | 5.6 | 6.51 | 5.31 | 6.42 | 2.26 | 3.37 |
| 9 | 5.7 | 6.51 | 5.31 | 6.41 | 3.10 | 4.32 |
| 10 | 5.8 | 6.51 | 5.32 | 6.40 | 3.58 | 5.31 |
| 11 | 5.9 | 6.51 | 5.33 | 6.40 | 4.51 | 6.32 |
| 12 | 5.9 | 6.51 | 5.34 | 6.39 | 5.44 | 7.31 |
| 13 | 5.10 | 6.51 | 5.34 | 6.38 | 6.41 | 8.29 |
| 14 | 5.11 | 6.51 | 5.35 | 6.37 | 7.40 | 9.27 |
| 15 | 5.12 | 6.51 | 5.36 | 6.37 | 8.37 | 10.27 |
| 16 | 5.13 | 6.51 | 5.36 | 6.36 | 9.36 | 11.30 |
| | | | | | | p.m. |
| 17 | 5.13 | 6.51 | 5.37 | 6.35 | 10.34 | 12.37 |
| 18 | 5.14 | 6.51 | 5.38 | 6.34 | 11.33 | 1.44 |
| | | | | | p.m. | |
| 19 | 5.15 | 6.51 | 5.38 | 6.34 | 12.34 | 2.49 |
| 20 | 5.16 | 6.50 | 5.39 | 6.33 | 1.38 | 3.52 |
| 21 | 5.16 | 6.50 | 5.40 | 6.32 | 2.46 | 4.51 |
| 22 | 5.17 | 6.50 | 5.40 | 6.31 | 3.56 | 5.43 |
| 23 | 5.18 | 6.49 | 5.41 | 6.30 | 5.3 | 6.26 |
| 24 | 5.19 | 6.49 | 5.42 | 6.29 | 6.7 | 7.2 |
| 25 | 5.19 | 6.49 | 5.42 | 6.28 | 7.4 | 7.37 |
| 26 | 5.20 | 6.48 | 5.43 | 6.27 | 7.53 | 8.9 |
| 27 | 5.21 | 6.48 | 5.44 | 6.26 | 8.32 | 8.40 |
| 28 | 5.22 | 6.48 | 5.44 | 6.25 | 9.10 | 9.11 |
| 29 | 5.23 | 6.47 | | | 9.41 | |
| 30 | 5.24 | 6.47 | | | 10.13 | |
| 31 | 5.25 | 6.47 | | | 10.43 | |

## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|---|---|---|---|
| 3 Jan. | ☽ Last Quarter | 4 34 | a.m. |
| 11 „ | ● New Moon | 10 28 | a.m. |
| 19 „ | ☾ First Quarter | 1 15 | a.m. |
| 25 „ | ○ Full Moon | 5 9 | p.m. |

Apogee, 8th January, at 1·42 a.m.

Perigee, 23rd January, at 9.48 p.m.

The Earth will make its nearest approach to the Sun on the 1st, when its distance will be about 91,300,000 miles.

The occulation of three small stars in Aquarius, known as Psi 1, Psi 2, Psi 3, will form an interesting spectacle for amateurs between 8 and 10 on the evening of the 15th. These naked-eye stars are of magnitude 4·5, 4·6, and 5·2. They will disappear on the dark edge of the crescent-shaped Moon under conditions very favourable when using a small telescope or binoculars. As the time of disappearance will vary at different places it will be desirable to commence observations before 8 o'clock. Psi 1 is a beautiful coloured double star, one of the components orange-coloured, the other sky-blue.

When the Moon is passing Omikron Piscium, late in the evening of the 18th, an interesting observation could be made by the owners of telescopes in the latitude of Warwick and Toowoomba in noting whether the star will disappear or merely skirt the edge of the Moon.

The Moon will be passing Mars on the 22nd at 6 p.m., and it will be interesting for those with keen eye-sight to endeavour to see Mars in daylight. It will be 4 degrees to the north of the Moon, or nearly eight times the diameter of the Moon away from it. The Moon and planet will be in the north-east, on the opposite side of the sky to the setting Sun.

The Moon will pass 5 degrees to the north of Neptune on the 26th about 9 a.m. when Neptune will be quite invisible without a powerful telescope.

Mercury will rise thirty-nine minutes before the Sun on the 1st and sixty-five minutes before it on the 15th. Venus will set at 9·14 p.m. on the 1st and at 9·25 p.m. on the 15th. Mars will rise at 5·45 p.m. and set at 3·42 a.m. on the 1st. On the 15th it will rise at 4·35 p.m. and set at 2·42 a.m.

Jupiter will rise at 1·25 p.m. and set at 1·43 a.m. on the 1st. On the 15th it will rise at 12·34 p.m. and set at 11·51 p.m.

Saturn will rise at 3·50 a.m. and set at 5·34 p.m. on the 1st. On the 15th it will rise at 3·3 a.m. and set at 4·46 p.m.

The Moon will be in Leo on the 1st; in Virgo from the 2nd to the 4th; in Libra on the 5th and 6th; in Scorpio on the 7th; in Orphincus on the 8th; in Sagittarius from the 9th to the 11th (new Moon); in Capricornus on 13th; in Aquarius from 14th to 16th; in Cetus on 16th and 17th; in Pisces on 17th and 18th; in Aries on 19th and 20th; in Taurus from 20th to 22nd; in Gemini on 23rd and 24th; in Cancer on 24th and 25th; in Leo 26th and 27th; and in Virgo from the 28th to the 31st.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. 1 FEBRUARY, 1929. PART 2.

## Event and Comment.

### Marketing of Bananas.

FOLLOWING upon his recent visit to Sydney and Melbourne, in the course of which, in conjunction with the Under Secretary (Mr. E. Graham), he had taken the opportunity of personally investigating the supply of bananas to the Southern markets, both in respect to the quality of the fruit and the conditions under which sales are effected, the Minister for Agriculture (Mr. W. Forgan Smith, M.L.A.) has issued a full statement as to the exact position in connection with these matters.

Mr. Forgan Smith said that it was found that a high percentage of bananas of satisfactory quality was now being supplied to the Southern markets. However, personal investigation had disclosed defects in the grading of the fruit, and there was ample evidence to show that individual growers frequently mark their cases in a manner wrongly describing the contents. In fact, in some cases brought under his notice the description was no indication of the contents at all. This irregularity in grading has been responsible for a good deal of the adverse comment to which the Queensland banana industry has been subjected. The inclusion of bananas of various grades in the same case has also had a detrimental influence. Instances of growers supplying three grades of bananas in one case were not uncommon, and examples also occurred of growers marking their fruit as being of "extra special quality" when inspectors at the growers' railing station had found it necessary to insist on altering this classification to that of "plain." Happenings like this, he added, indicated the necessity for the imposition of grade standards, and for a closer observance of the correct classification of the fruit, and justified the Department in the action it had taken to attain this very desirable objective. Uniformity in the method of packing the fruit by the growers would be of advantage. The presence of "squirter" in bananas was not detected, but the fruit, in a number of cases, had developed what is known as "wet end." This defect is of considerable concern to those engaged in

the ripening of bananas, because in practice it is found that the darkening and decay of the fruit expand considerably whilst in the ripening chambers. A large number of merchants are engaged in the ripening of bananas, but only in a few instances did the ripening chambers appear to meet the requirements, and it cannot be said that the ripening of fruit is carried out generally on scientific or systematic lines. In this connection Dr. Young, of the Council of Scientific and Industrial Research, is busily engaged in carrying out investigations relative to banana transport and the ripening of the fruit; and in furtherance of this object special chambers have been erected at one of the University buildings in Melbourne, and activities designed for similar purposes are being carried out by Dr. Baxter at the Queensland University.

## Banana Grade Standards.

CONTINUING, the Minister said that the grade standards as prescribed recently by the Queensland Department were fully discussed with the responsible officers in the Southern Departments of Agriculture, and New South Wales has at present under consideration the matter of prescribing standards for bananas, and it is probable that that State, as well as Victoria, will institute grade standards in conformity with those in operation in Queensland. In addition to inspecting a considerable quantity of bananas produced in Queensland, opportunity offered to see bananas that were grown in either New South Wales, Fiji, or Norfolk Island, and from the latter source some good specimens of the Gros Michel variety were observed, but, generally speaking, the quality of the bananas supplied from Queensland was equal to that obtained from other parts. Unfortunately, it is the practice of some fruitsellers to acquire good quality fruit from Queensland and dispose of it as Fijian.

The Minister expressed as his considered opinion the view that the outstanding influences militating against the industry in the Southern markets were irregularities in the grading of the fruit and the marketing of under-sized bananas. Both these defects could be overcome by the strict observance of the standard requirements and the concerted action of the growers. The satisfactory quality of Fijian bananas was frequently mentioned by persons engaged in the fruit business, but in very few instances was the desire expressed to introduce bananas from Fiji, provided that the Queensland growers were prepared to supply the market with fruit of satisfactory quality and packed in cases upon which the grade of the fruit was correctly marked. There is no reason why the banana-growers of Queensland and New South Wales should not be able to hold the trade in bananas within Australia, but those markets must at all times be supplied with fruit of satisfactory quality and adequate in quantity to meet the market requirements.

## The Queensland Sugar Industry.

THE criticism that has been levelled at portion of the last Annual Report of the Director of Sugar Experiment Stations appears to be very largely the result of slovenly reading, while an unfair article published recently in a Southern journal makes what looks like deliberate suppressions. In Dr. Kerr's report on some phases of the industry in Java, incorporated in the Director's report, to which exception has been taken, it was only intended to point out what had been achieved in Java by the adoption of scientific control methods, and it was not even inferred that such marked improvements could be effected in Queensland. Dr. Kerr says, "Although conditions in these islands are quite different to those obtaining in Queensland, still it is interesting to study the marked advances which have been effected during the last forty years by the application of the scientific method of control to the agriculture of cane growing"; while in speaking of intensive cultivation as practised in Java the report specifically states "it must, of course, be remembered that the costs of labour in Java are remarkably low," and "naturally many of the reforms which have been introduced could find but limited application in Queensland." Also, "by the system of land tenure operating in Java no ratoons are grown," and "the island is blessed with climatic conditions which are admirably suited for cane culture and that irrigation is practised almost generally."

It will thus be seen that the statements which have been objected to are qualified very materially, and the report should be read as a whole. It has also been stated that the returned travelling scholars should not have made reports until they had

gained some practical experience in the production of sugar in Queensland. As a matter of fact, the scholars did have extensive practical experience in the sugar districts of the State before going abroad, and one of them (Mr. Bennett) had also considerable mill experience in Queensland.

## The Researcher and the Producer.

IN his last Annual Report the Public Service Commissioner, Mr. J. D. Story, I.S.O., comments very pithily on current rural topics, and has this to say on the researcher and the producer:—

"The new slogan 'Research; Research' seems to be drowning the old slogan 'Produce; Produce.' The voice of the scientist rings through the land announcing discoveries which scientific research has made, and some of these discoveries approach the magical; compared with them, even wireless becomes almost a thing of yesterday. Listening to the fascinating accounts of these discoveries, one becomes a little uneasy as to whether science is not racing ahead of the producer and far out-distancing him; as to whether the farmer is actually translating into practical action the discoveries and teachings of science. That thought raises the further thought as to whether these discoveries are being communicated promptly to the producer in that simple, concise, and illustrative way which makes them easily grasped and strikingly appealing; whether facilities exist to make it possible for the farmer to follow the teachings; if the facilities do not exist what action is being taken to create them. Unless there be effective linking of the discovery of the scientist with the practical application of the producer, much of the scientist's work must go for nought and the producer will continue to suffer when he need not. And, remember that statistics tell us that approximately 40 per cent. of our male breadwinners are engaged directly or indirectly in primary production. What, then, would be the best form of link between the scientist and the producer? The technical officers of the Department of Agriculture do what they can, but even they, perforce, often have difficulty in keeping abreast of new developments; opportunities for doing so are not always available; nevertheless, the trained instructor appears to be the corollary to the trained investigator. Confining ourselves particularly to Queensland, the time seems to have come when we should try to sift carefully the discoveries of science which are of highest value to primary production, and determine ways and means by which the lessons can be driven home with force and vigour. Something more is needed than mere sermonettes on a subject such as 'Farming on Scientific Lines.' If it be worth while to engage scientists to discover new facts and new processes, it is surely worth while to develop schemes by which proved methods may be put into practice. But these things should not be left entirely to the State. Commodity Boards and kindred bodies have their obligations; they have their part to play and they should play it. In my limited sphere I shall help as much as I can. As a layman I have approached this subject with some diffidence; but even a layman sometimes gets a point of view which escapes the expert."

## Citriculture.

THE season for planting citrus trees will soon be favourable, and the attention of planters is particularly directed to the selection of varieties. In oranges, Sabina or Siletta and Joppa take precedence for Southern markets. These are only surpassed by navels which, unfortunately in many parts of the State, are not sufficiently productive to warrant their inclusion. A late variety, Valencia, takes precedence. Among mandarins, Glen Retreat is preferable in districts which are favourable, followed by Emperor, Scarlet, and for the Northern late crop, King of Siam. The difficulty of bud selection from trees of proved merit has been in a measure overcome by nurserymen procuring their supplies from approved trees. Though the additional cost is not high, it warrants a slight advance on the cost of trees. Growers would be well advised to insist on nurserymen supplying a guarantee that trees have been worked with the buds approved by the Department. The trees make three distinct growths in a year, and whilst dormant between any of these periods they may be transplanted with safety, but error on either side results in the root fibres perishing, and though the trees may survive they are very slow in making reasonable growth.

# Bureau of Sugar Experiment Stations.

## CROP PROSPECTS FOR 1929.

The Deputy Premier and Secretary for Agriculture and Stock, Mr. W. Forgan Smith, has received the following report from the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, upon the prospects of the sugar crop for 1929:—

"It is as yet too early to anticipate what the sugar yield this year is likely to be. Splendid rains have fallen in the districts above Townsville and at Mackay, so the crops should be good in those places, provided further wet season rain comes along. The southern areas are, however, needing rain urgently. A period of good soaking rains is required at Bundaberg, Childers, and in the cane districts to the south.

"The area under cane in Queensland is now approaching 300,000 acres, while the area from which cane was crushed in 1928 is given as 225,371 acres, being an increase over 1927 of some 21,623 acres. As there was an increase in the area crushed in 1927 of 14,436 acres over that given for 1926, it can be seen that the acreage under cane has materially increased in the past two years.

"The cane crop last year amounted approximately to 3,750,000 tons, which was easily a record, while the tons of cane required to make 1 ton of sugar are estimated to have been 7.25, which is the lowest to date."

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## ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

### FIRST PUBLICATION OF MONTHLY HINTS.

By EDMUND JARVIS.

This series of Entomological Notes was started five years ago (November, 1923), for the purpose of reminding our canegrowers of their responsibilities with regard to the control of those cane insects likely to be in evidence during each month of the year.

By early publication of full details regarding suitable methods of combating such insects, our object has been to save time, as far as possible, in order that growers may be in a position to tackle any pest upon the first indication of damage to the crop. Prompt action often goes far towards minimising injuries caused by such insects as "army-worms," or the grubs of some of our cane beetles.

Farmers are asked to take notice, however, that the activities of Meringa Experiment Station—in so far as visits of inspection from officers of the entomological staff, or the supplying of consignments of Tachinid fly parasites of the beetle borer be concerned—do not extend to localities below Townsville, or to those above Mossman.

### Control of Cane Grubs.

First-stage larvæ of the "greyback" will be feeding until about the middle of this month, after which they will change their skin and enter upon the second instar, during which stage of growth they are able to effect serious damage to cane situated on light volcanic soils.

In order to distinguish between these moults of the larval condition of our "greyback" cockchafer, growers need only examine the head; which, unlike the body, does not alter in size during the periods occupied by each successive instar.

The width of head in first-stage grubs is $\frac{1}{8}$ inch; in the second instar, $\frac{1}{4}$ inch; and in the third instar, $\frac{3}{8}$ inch.

During this month infested cane fields should be fumigated with paradichlorobenzene or with carbon bisulphide, both of which fumigants have been proved to be valuable remedies when applied at the right time and to soil in a fit state for such fumigation. With regard to the latter fumigant—the toxic effects of which endure for only a day—expense of material and application will be entirely thrown away unless the soil has first been found to be in the right condition for allowing the poisonous fumes to penetrate freely in all directions.

With paradichlorobenzene the case is very different, seeing that after injection of the crystalline nodules, evaporation of the deadly gas continues through a period of from four to six weeks or longer. Wet weather simply retards or checks its rate of evaporation, which, however, is again resumed as soon as any excess of moisture has drained away.

### Disturbing Grubs in the Soil.

Try to maintain a system of clean cultivation, particularly on land reserved for early planting, and which on that account is likely to receive less attention than areas devoted to the present season's crop. Advantage should be taken of the first opportunity afforded for moving the surface soil between rows of young shoots of plant or ratoon cane on land known to be liable to grub infestation. By disturbing the soil as close as can be effected without injury to the plants, first-stage grubs are often brought to the surface, while others are dislodged from their tunnels, becoming, in consequence, likely to fall an easy prey to ants or other soil-frequenting predaceous foes.

### Controlling Grubs of Cane Beetles.

During the beginning of February larvæ of our "greyback" cockchafer occurring in the district of Cairns will be in the first and second stages of growth, and on light volcanic soils will have commenced to cause appreciable damage to cane roots.

In first-stage grubs the head is never more than one-eight of an inch wide, although the length of the body during this first instar may vary from one-third to half an inch in its doubled-up condition. Those in the second instar can at once be distinguished by the increased width of head, which then measures three-eighths of an inch.

Growers should take advantage of the first opportunity afforded for moving the surface soil between rows of young shoots of ratoon or plant cane thought likely to be grub-infested.

At times when the weather sets in dry for a week or so after a short spell of rainy days such movement of the surface soil becomes highly advantageous, since it not only stimulates growth of the stools and conserves the moisture, but by disturbing the soil as close against the cane rows as can be effected without injury to the plants, some of these small grubs are brought to the surface, while others, being dislodged from their tunnels and mixed with loose particles of earth, are likely to fall an easy prey to soil-frequenting ants or other predaceous enemies.

### Fumigating Cane Grubs.

No time should now be lost before fumigating grub-infested land with paradichlor. or carbon bisulphide. In cases where soil injecters or special horse machinery cannot be easily procured, the crystalline nodules of the former fumigant (after being passed through ½-mesh sieve) can be applied with the manure in any fertilising machine that will drill in this mixture to a depth of about 4 inches, and at a distance of about 5 inches from the cane rows; and after burying it will fill in the drill and slightly consolidate such disturbed soil by rolling same. Be careful to thoroughly mix the fumigant with the manure to ensure an even distribution; and to regulate the flow of the mixture in such manner as to sow about 120 lb. of paradichlor. per acre.

### How to Fight Army Caterpillars and Plant-Eating Beetles.

Small beetles belonging to genus *Rhyparida* may prove injurious this month to young shoots or leaves of cane. The creamy-yellow grubs of this pest occur underground amongst the roots or in the centre of the shoots, giving rise to "dead-hearts"; while the beetles eat holes in the leaves of larger plants. Cutting out all dead shoots; collecting the beetles when very numerous; keeping headlands free from blady grass; and fumigating badly-infested soil with carbon bisulphide are all suitable remedial measures.

Outbreaks of army caterpillars, &c., can be combated by spraying the cane leaves in front of an advancing army with lead arsenate applied at the rate of 2 lb. in about 50 gallons of water. The mixture must be kept well stirred while being sprayed, as this poison has a tendency to settle to the bottom of the water unless kept agitated.

## CANE PESTS AND DISEASES.

*Mr. A. N. Burns, Assistant Entomologist, Central district, has submitted the following report for the month ended 12th December, 1928, to the Director of Bureau of Sugar Experiment Stations:—*

### Emergence of Greyback Beetles (*Lepidoderma albohirtum* Waterh.)

Following the beneficial rains of 25th and 26th November last, when just on 3 inches were recorded for the two days, the first, and probably general emergence of these beetles commenced. Since that time several more good falls of rain have occurred, keeping the soil in an ideal condition for the continued emergence of cane beetles. The numbers of beetles vary very considerably in different parts of the district. Plane Creek and Sarina report a moderate emergence only (from beetles received by collectors, and those noted on feeding trees) whilst around Racecourse and Farleigh areas large quantities of beetles are being collected. Feeding trees growing adjacent to the canefields along the Pioneer River are already almost denuded of their leaves. The same thing is to be seen in some of the feeding trees growing in the scrub lands adjoining canefields on the northern side of the railway line near Farleigh.

The writer has observed greybacks feeding on many trees that in the far northern areas were apparently free from attack. Native figs of various species (*Ficus* spp.) undoubtedly rank first in importance throughout this district as feeding trees, then Moreton Bay Ash (*Eucalyptus tesselaris*), Bloodwood (*E. corymbosa*), Blue Gum (*E. tereticornis*) and many different species of scrub trees are attacked to a more or less serious degree. As the beetle season advances, greater numbers of beetles may be collected from scrub trees, large numbers seeming to forsake the Eucalypts and other forest land trees.

Usually during the earlier portion of the flighting season male beetles predominate. From examples collected and dissected, however, at the present time the sexes appear to be fairly evenly proportioned. Hand collecting is being carried out in earnest throughout the district; this is to be greatly recommended, and in conjunction with the destruction of feeding trees growing in the immediate vicinities of canefields—particularly on the windward side—will tend to greatly minimise the subsequent grub infestation.

The writer would like to urge the advisability for the collection and payment of grubs as well as beetles. It is equally desirable, if not more so, to collect grubs; grubs collected in the months of February, March, and April will be prevented from doing further damage—they are active up till June and July—and that alone, particularly in the case of land that is being ploughed prior to planting, is invaluable. Besides the prevention of further injury, the subsequent emergence of beetles will be considerably lessened in areas where grubs are collected and destroyed.

### Main Emergence of "Frenchi" Beetles (*Lepidiota frenchi* Blkb.)

The recent rains have been responsible for bringing out the main bulk of this species, and every evening about dusk, large numbers may be seen in flight, subsequently settling down in pairs on low bushes, fences, &c. Unlike the greybacks, these beetles do not resort to "feeding trees" during the daytime, therefore if they are collected, advantage must be taken of the comparatively brief time occupied during the evening flight.

There is also another flight in the early morning which occurs about half an hour or twenty minutes before sunrise; the evening flight, however, is more favourable for collecting as the beetles are settling on objects, whereas in the morning flight they leave the bushes and enter the soil, after flying about in apparent confusion for some minutes. They sometimes settle near the ground and remain quiescent for a minute or two before finally burrowing in.

Recently, during evening flights, the writer obtained up to as many as nine specimens trying to cluster together, clusters of six and more were very plentiful, and hundreds of mated pairs were hanging everywhere. The aerial existence of this species lasts approximately six weeks or more, and night after night the beetles leave the soil in flight. The eggs of this beetle are not deposited as is the case with the greyback, in a definitely formed cell; they are laid loosely amongst the soil, usually at a depth of from 3 to 6 in. Each egg is enclosed in a small pellet of earth, due to the earth clinging to the glutinous matter on the egg shell immediately after it is laid. Oviposition habits, &c., are at present being studied at the laboratory.

### Christmas Beetles (*Anoplognathus boisduvali* Boisd.) in Flight.

These well-known "Golden Beetles" have been very plentiful since the rains of two weeks ago, and large numbers are being collected along with greybacks from feeding trees. In different localities, this species appears to favour different trees on which to feed. In the Cairns district the most favoured trees appear to be the Blue Gum (*Eucalyptus tereticornis*), Poplar Gum (*E. platyphylla*), Moreton Bay Ash (*E. tesselaris*), and Bloodwood (*E. corymbosa*), whilst on the Tully the writer obtained them in hundreds from young river myrtles (*Eugenia tierniana*). In the Mackay district, however, one of the most, if not the most favoured feeding tree is the common guava which fringes the roads, canelands, &c. Moderately large numbers may also be collected from the Blue Gums (*E. tereticornis*), Moreton Bay Ashes (*E. tesselaris*), and Bloodwoods (*E. corymbosa*). These beetles are voracious and rapid feeders. In many places the feeding bushes (guavas) already bear a "scorched" appearance due to the beetles having eaten all the leaf tissues away, leaving only the hard veins and midribs.

The writer bred examples of this beetle from grubs collected at the Experiment Station, also from several farms in the Mackay district. In each instance the grubs were found in canefields where the soil contained silt and wash from creeks, &c., and the injury caused to the cane was precisely similar to that occasioned by grubs of the "Dasygnathus Beetle" (*Dasygnathus australis-dejeani* Blkb.), i.e., the grubs had bored into the ends of the cane sets. In the writer's opinion, this and the Dasygnathus beetle rank almost equally in order of destructiveness in the Mackay district, and could be placed about third in order after the greyback and frenchi beetle grubs.

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*Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report for the month ended 12th January, 1929, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—*

### Wireworm Damage at Walkerston.

Following a request made by a grower at Walkerston, an inspection was carried out on a farm where considerable injury had been done and loss sustained as a result of wireworm damage. In one field of Q. 813 plant cane, fully 2 acres had been eaten out, and the grower had to supply new sets, in some instances as often as three times, in the attacked portion. The "supplied" area of small young cane stood out in marked contrast to the surrounding cane, which was fully 3 ft. or more high.

The field was almost level, but had a slight fall towards one end; the attacked portion occupied the lowest-lying part, and was the only place where water lodged during rains. The soil was fairly heavy, dark brown-black, and contained much silt; it had a tendency to consolidate when wet. Another small block of about half an acre on the same farm was also badly affected, and the grower stated that he always found it almost impossible to secure a strike in that particular block owing to the ravages of wireworms. The ground here was black and of a very heavy nature, and the situation was low-lying with poor drainage. Cane just across a roadway on higher ground looked excellent.

The conditions prevailing in the affected portions of this farm were precisely similar to those noted some weeks ago on a farm at Te Kowai where much damage was done by wireworms, and in each instance the attack was confined to the lowest and most poorly-drained parts of the fields.

Most of the injury had been wrought prior to the inspection of the above farm, for in searching in sets for the wireworms, only examples in the pupal stage could be found. Comparison with this, and the species found at Te Kowai recently, showed both to belong to the same species. Specimens from Te Kowai were bred through at the laboratory, and results show that the wireworms (larvæ) are active during the dry season months. They feed naturally on rotten vegetation and humus in soil, but owing to the extreme dryness of the spring and early summer months last year, they resorted more than usual to the cane sets for food and moisture. This also probably accounts for the fact that in all cases of infestation noted, the wireworms were present in the wettest and mostly badly-drained parts of the canefields, evidently concentrating there on account of the moisture remaining in those parts the longest.

**Greyback Beetles.**

The emergence that took place following the rains late in November last was the main and only one that occurred in the Mackay district, these beetles remaining in flight throughout December, and a few stragglers up to the present time. The beetles that remain up to the present time are in a worn or wasted condition. As stated in last report, as the beetle season advances, the beetles forsake the feeding trees growing on the forest lands and resort more to the scrub trees only. Practically all beetles observed by the writer during the past fortnight were noted on trees occurring along creek banks, or on the edges of scrubs, &c.

There being one general emergence of beetles only, subsequent grub injury will probably show up throughout the district at about the same time, owing to the fact that most of the egg-laying of the beetles occurred about the second and third weeks of December. Experiments along this line were carried out at the laboratory by caging a large number of female grey-back beetles, and results showed that most of the eggs were laid between the 14th and 27th December. None were laid by the caged beetles after 31st December.

If the early summer rains are divided as sometimes happens—i.e., two good falls occurring with two or three weeks of fine weather in between—the beetle emergence is almost always broken up into two smaller emergences; consequently, as the bulk of the beetles' eggs are laid at two different times, the following grub emergences will show up also at different intervals.

The number of eggs deposited by one female beetle varies slightly; from the caged beetles the highest number obtained from one beetle was 36. The average number, however, laid by one female beetle may be safely estimated at from 26 to 28.

**Greyback Grubs (*Lepidoderma albohirtum* Waterh).**

Young first-stage grubs of this species are now present in canefields, and as yet are mostly to be found amongst grass roots and cane roots near the surface. They will continue thus for about a month or a little longer in the first stage, when they will moult into the second stage. Some five or six weeks are occupied in this stage, when they again moult and enter the third and most destructive stage. Fumigation, however, should be carried out before the grubs reach this latter stage, which is also before they have done any appreciable injury to the cane plants. During the first two stages the actual injury to cane roots is comparatively negligible when compared with that occasioned by them during the four or five months that they are active in the third stage.

Growers who are troubled with grubs on their farms should look at stools in areas they know to be usually subjected to attack, and if they observe the small grubs in any number at the cane roots, should fumigate with carbon bisulphide or paradichlorobenzene. Information in regard to this will be given on application to the Experiment Station.

Grub injury that is showing up in cane at the present time, or that was noticeable during the past two or three months, is undoubtedly due to grubs of the "frenchi" cane beetle (*Lepidiota frenchi* Blkb.). Fumigation against this species should be carried out about October or November, when the third-stage grubs now in their second year (this species has a two-year life cycle) come up from their resting cells with the advent of warmer weather. This species is sometimes found in successive years in the same "spots" in canefields, so growers noticing their cane wilting from grub attack from October to January or February should investigate by digging at the stools, where the large third-stage grubs will most probably be found. If desired, fumigation may be then carried out, or else the spot marked and the cane fumigated the following season, preferably before the grub injury shows up in the cane leaves.

The principal identifying characters of the greyback (*L. albohirtum* Waterh.) and frenchi (*L. frenchi* Blkb.) grubs is the difference in the arrangement of the hairs or bristles in their anal paths, i.e., the two rows of bristles on the ventral surface of the last body segment. In the greyback grub these bristles run in two parallel lines enclosing a narrow space between them, whilst in the frenchi grub they enclose a small elongate pear-shaped area, the large end of the pear shape being nearest the anal end of the body.

**Eggs of Other Species of Beetles.**

Other experiments have been carried out in connection with the ovipositing of other species of cane beetles and allied species, details of which will be given in future reports. The following, however, are the maximum numbers of eggs

obtained from one female of each of the following mentioned species of beetle:—Frenchi beetle (*L. frenchi* Blkb.), 26 eggs; Christmas beetle (*Anoplognathus boisduvali* Boisd.), 17 eggs; another species of Anoplognathus, 17 eggs; Anomala beetle (*Anomala australasiæ* Blkb.), 34 eggs; dusky cane beetle (*Dasygnathus australis* Boisd.), 15 eggs; golden beetle (*Anoplognathus mastersi* Macleay), 8 eggs; and the blue beetle (*Repsimus æneus* Fab.), 29 eggs.

In the case of each of these, the duration of the incubation of the eggs, &c., is being studied, and it is intended to study the complete life cycle of each of the above species, and in some cases their actual effect on cane plants.

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*Mr. R. W. Mungomery, the Southern Assistant Entomologist, has submitted the following report for the period November-December, 1928, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—*

## Notes on the Black Beetle (*Pentodon australis* Blkb.)

During the past two years, whilst studying the economy of several of the larger and more important Scarabæid grubs which attack sugar cane in Southern Queensland, our attention has frequently been centred on what is commonly termed the Black Beetle (*Pentodon australis* Blkb.). These beetles, like many other Dynastids, breed well under confined conditions, and during the time that they have been kept under observation at the laboratory, much data has been obtained in relation to their life history. In addition to this, notes have been made of the behaviour of both the larval and adult stages under field conditions, this evidence having been obtained when following ploughs, and by digging &c., and in this manner a considerable amount of information has been amassed. Although all the points connected with the behaviour of this beetle are by no means elucidated, it was thought desirable at this juncture to publish some of the more important details of its life history. By so doing, it is hoped that those who are at present embarrassed by the presence of this beetle on their cane lands, after having gained a more intelligent outlook on the pest, may be able to attack it in a more straightforward manner.

The beetle, which is of a uniformly shining black colour, is from ½ to ¾ of an inch in length, female specimens usually being the larger of the two, and it is familiar to most canegrowers since its range of distribution includes practically all the sugar-growing districts of Queensland. Those who are unfamiliar with it are referred to a detailed description of the beetle, by Mr. E. Jarvis, on page 29 of Bulletin No. 3 "Notes on Insects Damaging Sugar-Cane in Queensland." In the South they are met with in the low-lying clay soils of the Pialba district, and on those farms adjacent to the Maroochy River, where for the most part they eat the eyes and tender shoots of germinating sets, thereby checking growth or producing blanks. In the drier, red volcanic soils of the Isis and Bundaberg districts the same beetle does not appear to give any great trouble. From the evidence of most districts suffering the ravages of this pest, it is apparent that a correlation exists between land growing paspalum grass and the incidence of black beetles on that land, for young cane suffers worst on land which had carried good crops of paspalum grass immediately previous to planting cane there.

Although the beetles are known to feed more or less throughout the year, feeding becomes more pronounced at the commencement of spring, and soon afterwards eggs are produced. The eggs are laid singly in the soil at depths of 6 to 8 inches, and our first records of egg deposition are towards the end of August. The incubation period of the egg is then about twenty-six days at a mean temperature of 63 deg. Fahr. As the spring draws on and the temperature increases, so does the rate of egg deposition increase until a maximum is reached in the months of October and November when the numbers again show a sharp decline. Conjointly with the approach of warmer weather the incubation period steadily lessens, this being nineteen days in October at a mean temperature of 69 deg. Fahr., and fourteen days in December at a mean temperature of 75 deg. Fahr. Soon after hatching from the eggs the young grubs commence to feed actively, ingesting large quantities of soil and rotting vegetation before becoming full grown, and it is from this rotting organic matter that they derive most of their nourishment. In addition to the beetles, these grubs are sometimes responsible for injury to cane, and their chief damage consists in eating into the ends of cane sets and hollowing them out. Thus it will be seen that they are not essentially root eaters like our notorious "furfuracea" and allied grubs.

The duration of the various stages is approximately as follows:—

| | |
|---|---|
| First larval instar | 17 to 25 days |
| Second larval instar | 14 to 16 days |
| Third larval instar (including prepupal period) | 44 days |
| Pupal period | 14 days |

The entire cycle from the act of oviposition to the appearance of the adult beetle is approximately four months, this being a short life cycle when compared with our more common beetles which have a two-year period. Generally speaking, there is but one generation a year. Those beetles which become adults in the month of February and March, i.e., the result of the main October and November batch of eggs, do not usually commence reproducing until the following spring, but in the case of beetles emerging towards the latter end of December or in January, these may commence reproducing soon after feeding, so that in rare instances two generations may be produced in a year. The fact that in a few isolated cases third-stage grubs of *Pentodon australis* have been found in the field as late as June, supports the possibility of there being two generations under natural conditions, or else these grubs might represent a late production of eggs from the original spring beetles.

The longevity of these beetles is surprising. Unlike other beetles which, after emerging, mating, and extruding their egg supply, die soon afterwards, these beetles produce a few eggs at a time over a long period, and at present we have beetles that have been living in confinement for the past two years. They have produced eggs after each winter and are still active and functioning as though living under normal conditions. These are still being kept under observation to ascertain their maximum span of life in the adult stage.

Control measures are chiefly dependent on the time and method of cultivating the ground, and are such as would readily suggest themselves to anyone conversant with the life history of this pest. Paspalum grass land should not be broken up and hurriedly planted with cane. Instead, an interval of two months or more should elapse between ploughings in the spring and summer months so that the insect will be exposed in its larval stages to the numbers of insectivorous birds which usually follow ploughs. If possible, it is desirable that planting be carried out in autumn. If this is not possible on account of wet weather, which is so often a drawback to autumn planting, or should spring planting prove more suitable to that particular district, and it is decided to plant in spring, the land in this case should then have been prepared for planting some time previously and given a bare fallow, when the beetles will be forced to migrate elsewhere for their food supply. Beetles should also be collected and destroyed. The advice previously tendered by the writer in the "Queensland Agricultural Journal," Vol. XXVI., page 482, on the necessity for selecting large plants as an aid in combating this pest, could also be followed with advantage.

### *Anoplognathus* spp. (2).

In company with the preceding species a few examples of slightly smaller though very similar beetles have been collected from guavas, and large numbers from the Blue Gum (*E. tereticornis*) and Moreton Bay Ash (*E. tesselaris*). At first, on account of their similarity, it was thought that they were only sexes of the Christmas Beetle (*A. boisduvali*), but on close examination and finding pairs mating, there was absolutely no doubt as to their being a distinct species.

Examples of both species were brought to the laboratory and caged alive, already large numbers of eggs have been deposited, so it is hoped that their life stages will be bred through this coming season.

A few isolated examples of another smaller Anoplognathid were collected at Peri and Farleigh from Moreton Bay Ash trees (*E. tesselaris*) only.

### Anomala Beetles (*Anomala australasiae* Blkb.) in Flight.

This small dark blue-green beetle has been observed singly for some time, but since the more continued rains moderately large numbers have been noted in flight about dusk. The beetles are fond of congregating in groups on the tops of fence posts, stumps, &c. Unlike most of the other cane beetles which are leaf feeders, these insects prefer flowers, the principal of which are those of the common Lantana. Many specimens may be seen at dusk on these bushes, where they eat out the corolla of the flowers. A good many of the beetles have also been observed on Duranta and Frangipanni flowers.

The grubs of this beetle are found mostly in soil which is rich in humus or alluvial deposit, and, where they occur, are usually to be found in fairly large numbers. An allied species (*Anomala orientalis*), is responsible for considerable injury to cane in Java.

### Miscellaneous Beetles Noted.

Specimens of the large and well-known Elephant Beetle (*Xylotrupes australicus* Thom.) have been observed flying to light during the past fortnight, and although searches have been made on several Poinciana trees—on which the beetles fed—no examples have so far been found on these trees. This beetle cannot be classed as a cane beetle as its large grubs are only to be found in compost heaps, filter press, heaps of wood shavings, sawdust, &c. incorporated with soil.

Whilst shaking Moreton Bay Ash trees (*E. tessellaris*) odd specimens of the dark blue-green beetle (*Repsimus æneus* Fabr.) and the bright green beetle (*Calloodes rayneri* Macleay) have been collected. A specimen of the latter species was obtained from a guava tree where it was taken in company with Christmas beetles (*A. boisduvali* Boisd.). Isolated specimens of the small true golden beetle (*Anoplognathus mastersi* Macleay) have also been captured whilst flying to light.

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*Mr. R. W. Mungomery, Southern Assistant Entomologist, has submitted the following report for the period December, 1928, to January, 1929, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—*

### Coloured Lights as an Attraction for Cane Beetles.

During the annual flight of beetles, which last year took place in December, further investigations were carried out in connection with the reaction displayed by the species *Pseudoholophylla furfuracea* Burm. (i.e., the species commonly met with in the Isis and Woongarra districts) when subjected to the influence of coloured lights. It had been demonstrated some time previously that the trapping of beetles of this species from year to year was not attended by any great benefit in lessening the number of grubs present in these districts in succeeding years, in so much that practically only male beetles were caught, whilst females escaped to reproduce their kind. In selecting coloured lights as a probable means of control, the writer was not sanguine of success on account of the poor results obtained from the past use of the ordinary yellow kerosene light, but it was deemed advisable to determine the degree of response exhibited by this species before abandoning this line of control. The lights used were red, dark blue, pale blue, and green, these being the various colours that were available. The traps were so spaced in the field that the rays from one light did not interfere with the rays from another, and the results of the collections made from the tubs over which each light was suspended are summarised below:—

| Colour of Light. | Male Beetles. | Female Beetles. |
|---|---|---|
| 20th December, 1928. | | |
| Red | 176 | 2 |
| Dark Blue | 123 | 0 |
| Green | 307 | 1 |
| Pale Blue | 168 | 6* |
| 21st December, 1928. | | |
| Red | 37 | 0 |
| Dark Blue | 61 | 0 |
| Green | 205 | 0 |
| Pale Blue | 56 | 0 |

* The number of female beetles caught at this trap shows a somewhat higher proportion than in the collections made at the other traps. This might be explained by the fact that there was an attendant at this trap, and it is probable that some beetles may have been picked up on the ground surrounding the trap and placed in the container.

The results of this experiment went to prove that no appreciable benefits were to be derived from the use of coloured lights as a means of trapping beetles, and as it became more apparent on each succeeding night of the flight, this line of investigation was accordingly abandoned.

### When Lights are Beneficial.

The use of light traps against insects which are active at night has frequently been the subject of investigation by entomologists, and several experiments have been conducted to prove the usefulness or uselessness of this form of control. Many years ago Slingerland made extensive experiments in America on this subject, and the following is the result of his findings:—

> "From 20th May to 1st October nearly 13,000 insects were caught. Seventy-seven per cent. were neutral, 10.4 per cent. beneficial, and 12.6 per cent. often pests; of the pests 79 to 93 per cent. were males; of certain beneficial forms 80 per cent. were females; and as many friends as foes were caught."

Although trap lanterns can be used with undoubted advantage against some insects, the writer is of the opinion that more benefit is to be derived from lights in locating beetles and collecting them from the objects on which they have settled, than by attempting to attract them to the light itself. In this connection the cane beetle (*Lepidiota frenchi* Blkb.), whose grubs at times do extensive injury to cane on some of the forest lands of the Bundaberg district, lends itself admirably to being collected by means of a lantern or torch. Soon after dusk these beetles emerge and mating pairs are then seen hanging from the cane leaves, fence posts, or shrubs, &c., close to the fields from which they have emerged. Some hours after mating they fly back to the fields to deposit their eggs, and thus the immense advantage to be gained by collecting these beetles is apparent, especially as the collector is assured of a 50-50 ratio in regard to the two sexes. If the female beetles are destroyed before their eggs are laid, this means approximately thirty potential grubs destroyed for each female, and if the collection of this species were systematically carried out, grub infestation in the year following would be materially lessened.

This method is hardly applicable to "furfuracea" beetles, for mating pairs are usually found on the ground and are very inconspicuous against the red soils where their grubs are found. The collector has mainly to rely on his sense of hearing and is attracted to these pairs by the continual buzz which the other beetles surrounding them make. At best, less than one hundred females can be taken on the first night of the emergence by experienced collectors in heavily-infested areas, and this represents a very small proportion of the females which must emerge from that locality. On succeeding nights the numbers taken show a marked decrease.

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## CANE PEST COMBAT AND CONTROL.

*Mr. E. Jarvis, Entomologist at Meringa, has submitted the following report dealing with recent activities of the Meringa Station in connection with control of the adult or beetle condition of Lepidoderma albohirtum Waterh. for the period December to January,* 1928-29, *to the Director of the Bureau of Sugar Experiment Stations:—*

### Additional Notes on Poisoning Greyback Cockchafers.

This branch of control work was first initiated by the writer in January, 1915, when cage experiments were carried out at the Gordonvale Laboratory to test the effect of arsenical solutions sprayed upon food-plants of this beetle. The result obtained (described fully in Bulletin No. 17, pp. 12 and 13) showed that specimens placed with leaves sprayed with lead arsenate 2 lb., molasses 1 lb., in 50 gallons of water, died about nine days after feeding.

Six years later (1921), when this phase of control was again taken up by the writer, the results from five sets of experiments (comprising 89 cages, each containing a beetle and some sprayed foliage) showed that Paris green 1 lb., lime 1½ lb., in 8 gallons of water, was fatal in from four to seven days (Bulletin No. 17, pp. 70-72).

During December, 1926, this work was continued in order to determine the effect of stronger lead arsenate sprays, and of dry dusting of the leaves with various arsenicals. Excellent results were obtained at this time from foliage sprayed with lead arsenate 2 lb. in 10 gallons of water; the beetles eating such poisoned leaves dying the following day.

Experiments with dust sprays, however, were rendered inconclusive owing to the beetles—both in the treated and control or check cages—having apparently finished feeding prior to their capture from the trees.

Investigations in this connection during the present season (1928-29) have been based largely on the foregoing results derived from laboratory trials; these having been deemed sufficiently encouraging to warrant further study under field conditions.

The apparatus used in this outside work consisted merely of light wood frames made of filleting, covered on the sides and top with mosquito netting, and enclosing a space of 80 cubic feet, which were placed over young trees of *Ficus pilosa*, 4 to 5 feet high, growing at the Experiment Station. The two poisons tried were calcium arsenate and lead arsenate, the former being made up in the proportion of—Sodium arsenite 8 oz., lime (unslaked) 6 lb., water 20 gallons; while the arsenate of lead in the latter spray was applied in the proportion of 8 lb. to 40 gallons of water.

**Effect of Arsenate of Lead on Cane Beetles.**

In this experiment the wooden bottom of the frame enclosing the fig tree stood upon flat sheets of galvanised iron, on which, close to the stem of the tree, tins of moist soil and other suitable harbour for the beetles during the daytime were placed. One hundred specimens of greyback beetle—which had probably not been on the wing more than about four days—were collected from feeding-trees on 26th November, and enclosed at once in the frame. The foliage of the trap-tree was sprayed with lead arsenate (2-8 formula) to which a little casein had been added to ensure even spreading; the pump used being of the Knapsack pneumatic form, throwing a fine misty spray. Mortality of the beetles commenced after the second night of feeding, continuing at intervals until 5th December, as shown by the following table:—

Mortality of Beetles Eating Leaves Sprayed with Lead Arsenate.

| 1928. | Beetles alive. | Beetles dead. | Escaped. |
|---|---|---|---|
| November 26 .. .. .. | 100 | | |
| „ 27 .. .. .. | 99 | 1 (female) | |
| „ 28 .. .. .. | 85 | 14 (6 males, 8 females) | |
| „ 29 .. .. .. | 64 | 13 | 8 |
| „ 30 .. .. .. | 54 | 10 | |
| December 1 .. .. .. | 48 | 6 | |
| „ 3 .. .. .. | 9 | 35 (12 males, 23 females) | 4 |
| „ 5 .. .. .. | 0 | 9 | |
| | 0 | 88 | 11 |

As a result of the above experiment certain data of an interesting nature have been secured with regard to the economy and habits of the cockchafer in question. None of these hundred "greybacks" lived longer than ten days after capture; and, as portions of several of the leaves had been eaten, we may reasonably assume that about 75 per cent. of the beetles either nibbled the edges or devoured small pieces of the poisoned epidermis, as shown by damaged leaves on the tree. Fully 80 per cent. of the specimens harboured during the day in the moist soil provided, although many were usually found resting in a torpid conditions on the sides or corners of the frames, and a few upon the leaves of the fig-tree. A large percentage of the dead beetles was discovered buried in the soil, the remainder lying on the floor of the frame or under debris. The former had probably succumbed to the poison soon after digging at daybreak, while the latter had most likely died during the hours of darkness. In similar frames of netting which were placed over fig-trees on cultivated land, the soil was allowed to form the floor (16 square feet in size), and in such cases practically all the cockchafers passed the day underground, very few remaining on the netting or leaves after daybreak.

Another cage of similar size, which was put over a fig-tree sprayed on 17th November with arsenate of lead (2 lb. to 10 gallons of water) gave a mortality of two female beetles on the following day; proving that lead arsenate when applied at this strength is very deadly to our cockchafer beetle. Furthermore, it does not injure the leaves of such trap-trees or check growth of the budding foliage at ends of the shoots.

**Effect of Calcium Arsenite on Cane Beetles.**

On 16th November, a young tree of *Ficus pilosa*, about 4 feet 6 inches high, was sprayed with calcium arsenite, mixed in proportion of 8 oz. sodium arsenite, 6 lb. quicklime, in 20 gallons of water. This was enclosed in a netting-covered frame measuring 4 feet by 4 feet by 5 feet high, the lower edge of which was let into the soil to a depth of about 4 inches. Fifty-two newly emerged "greybacks" were then placed under the frame and covered over with moist soil. Unfortunately, conclusive data regarding mortality was not obtainable from the cages let into the soil in this manner, as despite precautions taken to consolidate the ground against the lower edges of such frames, more than half of the imprisoned beetles managed to escape by tunnelling under the lower ground plates. The poison, however, proved fatal after the fifth night, while fifteen beetles were found dead between the dates 21st to 24th November. These figures were probably higher, since the mortality occurring amongst the numerous beetles which had escaped during these four days but which had fed on the poisoned leaves could not be determined. We may gather from results obtained by the abovementioned field experiments that a row of small trap-trees planted about four chains apart on some suitable headland, and sprayed with lead arsenate as soon as possible after the emergence of "greybacks," should help to materially lessen the numbers of this pest occurring on cane land in the near vicinity.

Those in the habit of collecting these beetles for sale are aware that they show decided preference for certain feeding-trees, upon which they tend to congregate in considerable numbers each season. Many of those visiting trap-trees would probably taste the leaves before passing on, and such slight nibblings would prove fatal a few days later.

Seeing that twelve to fourteen days must elapse after emergence before the commencement of egg-laying, all the beetles visiting such poisoned foliage during a period of at least nine days would perish. In the event of migrating beetles settling in such trees, heavy mortality would be likely to occur; especially amongst assemblages which had travelled several miles without feeding.

As already suggested in previous reports (Bulletin No. 17, pp. 64 and 65), the best plants to use for trap-trees in the district of Cairns are the Moreton Bay Ash (*Eucalyptus tessalaris*), the Weeping Fig (*Ficus benjamani*), and *Ficus pilosa*. These can be grown with very little trouble from seed or from cuttings planted during the wet season. Such trees should be pruned occasionally, with view to encouraging a low and spreading growth of foliage which can be easily sprayed, or beetles collected from same without difficulty.

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*Photo.: Jean Easton.*]

PLATE 29.

Arable and Pasture Lands on Coochin Coochin.

# THE CONTROL OF MEAT ANTS.

By W. A. T. SUMMERVILLE, Entomological Branch.

Although under most conditions the common meat ant (*Iridomyrmex detectus*) can scarcely be considered in the light of a pest, it frequently happens that, when present in very large numbers or when nesting in certain places, they are far from welcome. In the worst cases they do assume pest proportions. It has, therefore, been considered advisable to carry out some trials with a view to determining the most efficient method of control for these insects.

Accordingly, experiments with this object in view have been carried out. As far as possible the work has been done with cheap substances, safe to handle and reasonably easy to procure.

The nests used in the trials were from medium to large in size. These terms are used according to the following standards:—Large nests have a mound of 25 to 35 cubic feet, medium-sized ones a mound 18 to 25 cubic feet, and small ones less than 18 cubic feet.

Of the materials used, by far the best results were obtained with carbon bisulphide, and this substance used as described below can be confidently recommended for the control of the abovementioned species of ant.

However, the results obtained with calcium cyanide are well worthy of note, particularly by such men as happen to have a power blower of some simple type.

In recording the results obtained, it has been considered advisable to include not only the favourable ones but also some unfavourable ones obtained with substances which might otherwise appeal to the farmer.

## Summary of Results.

The results obtained with the following seven substances will therefore be given:—

1. Carbon bisulphide.
2. Calcium cyanide.
3. Hot tar.
4. Kerosene.
5. Paradichlorobenzene.
6. Grass and chippings.
7. Hot and cold water.

## 1. Carbon bisulphide.

From experiments performed with this liquid it was ascertained that used as follows carbon bisulphide is an efficient though not particularly cheap means of control:—

(*a*) For a medium-sized nest it is necessary to use a little less than half a pint of the compound. The amount for each other size can be calculated directly using the standards as laid down above.

(*b*) Pour a little into each of the main holes making sure that there is a fairly good distribution throughout the nest.

(*c*) Immediately cover the nests with sacks.

(*d*) Wait three or four minutes and then apply a light. The light must be attached to the end of a stick at least 3 or 4 feet long. The bags should be quickly removed and then the light applied in two or three places. The bisulphide is highly inflammable and no risks should be taken when applying the light.

Care must be taken not to explode the gas too soon. If the light be applied in less than the stated time it will be found that there is only a relatively quiet burning taking place, and no explosion causing the galleries to be shattered, occurs. The burning is therefore far less efficient than the exploding.

(*e*) The explosion is not completed for some minutes. It is therefore advisable to wait about five minutes and then replace the bags over the nest. By again covering the nests the fumes are retained for a longer time and many ants, not killed outright during the explosion or before it, will thus have less chance of recovering.

(*f*) To obtain the best results it is advised that the work be carried out in the late afternoon at which time there is the greatest number of ants present in the nests.

### 2. Calcium cyanide.

Two brands of calcium cyanide were used—Cyanogas "A" dust, and Cyanogas "B" dust. Experiments were carried out with amounts varying from 1 to 3½ oz. on different sized nests. The dust was injected by means of (*a*) hand blow gun; (*b*) dust gun.

From these experiments the following conclusions have been arrived at:—

(*a*) The Cyanogas, especially in the form of "A" dust is highly destructive to this species of ant.

(*b*) The best cheap available means of applying the dust are not at all efficient except for the smallest nests. The pressures which can be produced by these blowers are far too small to force the dust any distance into the large-sized nests.

(*c*) Owing to the facts outlined in (*b*) it was not possible to determine the quantity of dust necessary per nest, but results obtained indicate that it would be very small. Indeed, it would appear that if suitable means were available for injecting the dust the cost would be somewhere about one-fifth that of carbon bisulphide.

### 3. Hot tar.

Hot tar proved to be quite ineffective. It did not reach the queen or immature stages which are usually hidden well down in the nest. It merely blocked up the entrance holes and passages and the surviving adult workers simply set about making fresh openings into the galleries.

### 4. Kerosene.

Kerosene is equally ineffective for, although fatal to those ants with which it comes in contact in quantity, too much would be necessary to allow of its general use.

### 5. Paradichlorobenzene.

This substance was tried in fairly heavy dosages but there was no indication that it destroyed or even irritated the ants.

### 6. Grass Chippings.

It sometimes happens that it is desirable to cause the ants to move from a particular spot. In such cases there is generally no necessity to kill the insects and it will be found that grass or chippings spread fairly thickly over the mound irritates the ants to such an extent that they soon build a new nest elsewhere.

### 7. Hot and cold water.

Water, hot or cold, pored into the nests several times daily for a few days, was found to cause the ants to move their nest to a new place but did not kill the insects.

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## OVERFAT PIGS.

It seems that the common practice of fattening bacon pigs in a small pen, where they have an abundance of food, such as maize, milk, and roots, but very little exercise, is the chief cause of overfat pigs coming into the bacon factories.

On most farms where pigs are being topped up for the factory, they are penned in small places, about two months before they are prime weights and then fed very liberally; this, with a lack of exercise and green food, naturally tends to put the required weight on to the pig more in the nature of fat and soft flesh than as firm flesh and little fat.

Over-fatness it not the only trouble we find in pigs which are confined in small pens. In most cases, it is not convenient to have these pens cleaned out frequently and the result is a hotbed of filth for the pigs to live in. These conditions are conducive to disease and parasites in the pigs, and while in this condition the pigs will not make the required maximum growth.

Considering the conditions under which we are getting overfat pigs, it would seem that the best way out of the trouble is to graze the pigs either on grass or fodder crops, right from weaning age up to the time they are sent to the factories.

It will be agreed that pigs will run off all their condition and will not fatten properly while grazing in large yards or paddocks, but in practice some progressive farmers are topping off their pigs while on pasture, and these men are quite satisfied. Their pigs are certainly healthy and in good marketable condition when they reach the required weights.

As the Queensland farmer has to market his pigs at a comparatively early age, the animals are still growing fast while they are being topped for the market, and, therefore, need conditions and feed suitable for fast growth more than for fattening. Certainly the best conditions for growing pigs are plenty of exercise and sunlight, with ample feed of good variety and quality.

For those farmers who are dubious about fattening pigs on pasture, it would be advisable to try the scheme with a fair-sized mob of pigs, just to prove for themselves that it pays in every way to run pigs on pasture right from weaning up till the time they leave the farm for the bacon factory.—L. A. Downey, Instructor in Pig Raising.

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## RURAL ROUTES IN QUEENSLAND.

### THE WORK OF THE MAIN ROADS COMMISSION.

In our last issue we reviewed briefly the work of the Main Roads Commission as set out in the Seventh Annual Report. Through the courtesy of the Commission, through its Secretary (Mr. J. E. England), we are now able to present the rest of the plates with which the report was illustrated and which indicate the value of this phase of the widely-embracing rural policy of the Queensland Government.

PLATE 30.—PORTION OF MAIN SOUTH COAST ROAD.
Quartzite gravel bitumen-surfaced 20ft. wide.

PLATE 31.—BRISBANE-IPSWICH ROAD EXPERIMENTAL SECTION.
Bitumen of various grades and varying quantities under test.

Plate 32.—Pine Shire. Bri bane-Gympie Road,
Showing stage construction, the final surface being penetration bituminous macadam.

Plate 33.—Noosa Shire. Cooran-Kin Kin Road,
Showing deviation over Range serving fruitgrowers and dairymen.

PLATE 34.—TIARO SHIRE.
Maintenance gravel on old Maryborough-Gympie Road.

PLATE 35.—AYR AND THURINGOWA SHIRES. HAUGHTON RIVER LOW-LEVEL BRIDGE.
Carrying sugar railway (2-ft. gauge) and road traffic.

Plate 36.—Cairns Shire. On the way from Gordonvale to Little Mulgrave River.
Deviation to improve grade and alignment of old road.

Plate 37.—Ayr Shire. Bridge over Bannister's Lagoon.
Reinforced concrete substructure, timber superstructure.

PLATE 38.—TINAROO SHIRE, NORTH QUEENSLAND.
YOUNGABURRA-LAKE BARRINE ROAD.

Plate 39.—Wangaratta Shire. Collinsville-Mount Coolon Road.

Low-level timber bridges and concrete causway over Bowen River, which have been severely tested by several floods. Maximum flood level is 60ft. above deck.

PLATE 40.—HERBERTON SHIRE. KABAN-LONGLANDS GAP ROAD,
Showing rubble metal section.

## THE "WINSALL" TOMATO.

Mr. M. C. Wood, Toombul, writes:—The tomato known as "Winsall" was raised by Henderson and Company, New York, and was first released by them in 1924. The raisers claim it to be bigger and better than "Ponderosa," and the claim is well justified by the experience of the writer. This is by no means exceptional, as they may be grown to well over 2 lb. in weight without difficulty. The skin is of the same colour as that of "Ponderosa," but the flesh has less pulp, more "meat," and fewer seeds. But, like Ponderosa, it has two faults, i.e., bud dropping and occasionally deformed fruit; however, in spite of the former, very heavy crops are borne. The one illustrated was grown in my garden, not with a view to obtaining great size, but as a test with four other varieties—viz., "Matchless," "Ponderosa," "Walker's Recruit," and "Yates' Erliwinner"—to ascertain which variety the soil suited the best. The soil is a light sandy loam rather deficient in humus. It was heavily dressed with superphosphate and the potash was supplied in the form of wood ashes, both being thoroughly mixed with the soil before planting. Each plant was staked and grown to a single stem. During growth, but after the first fruits had set, the plants received two applications, at an interval of two weeks, of liquid nitrate of soda to keep the sap moving as the season became dry. No other fertiliser was used. Although the season was a particularly dry one, which no doubt accounted for the almost entire absence of the usual fungus troubles, the plants were kept well irrigated with the result that very little (blossom-end rot) developed. "Matchless" was affected slightly, but "Winsall" and "Ponderosa" were practically free.

*A JOURNAL OF WIDE INTEREST.*

*A Ballarat (Victoria) subscriber to the Journal, renewing his subscription for 1929, writes:—*

*"You are to be congratulated both for the get-up and wide interest of your Journal. It deserves to be read, digested, and prized by all who claim to be lately and credibly informed."*

# THE AGRICULTURAL POSITION IN QUEENSLAND.

## WEATHER AND CROPS

*The Minister for Agriculture and Stock, Mr. W. Forgan Smith, has received from his Officers, the following summary of the position of the general agricultural crops in Southern and Central Queensland for the last quarter of* 1928.

### Weather.

Southern districts were not generally so fortunate in regard to rainfall as those in the Northern and Central portions of the State. Useful rains, however, were experienced, but the storms were more or less irregular and patchy in character. Reports from the closely settled areas of the Boonah district are to the effect that dry weather has seriously affected production, although a considerable area of land was prepared for the sowing of seasonable crops. It is expected that several thousand acres of maize will be planted after the heavy rain which fell on the 31st December. Crops for green fodder purposes will about equal the area planted last year. The Beaudesert district appears to be more fortunate in regard to thunderstorms, many of which were experienced during November and December, and as a result forage crops were extensively planted. Generally speaking, these and other crops are showing good growth and promise.

### Wheat.

From the latest information made available by the Secretary of the State Wheat Pool, it is estimated that the 1928 harvest will approximate two and three-quarter million bushels of grain, the quality of which was fair to good. Crops sown on early and well-prepared land made the best growth and returned the heaviest yields. On the other hand, late sown areas suffered from a run of dry weather in August and September; the October rains wrought a wonderful improvement in all wheat crops, and in some instances the yields were high, a few fields returning in excess of 40 bushels per acre. Unfortunately, some of the late planted areas, particularly on the red soils in the neighbourhood of Clifton yielded very lightly. Notwithstanding this fact the average yield should be a little above normal.

### Maize.

In most districts in Southern Queensland the sowing of early maize crops was considerably delayed owing to the dry spring. However, matters were more favourable this year than last in the Kingaroy district; here, a considerable increase was noted in the area planted with maize. This may have been influenced by the somewhat unsatisfactory conditions existing in the peanut industry.

### Peanuts.

Approximately 6,000 acres will be planted with peanuts this year. Many fields cropped last year with peanuts have been planted with maize. Good progress is being made with the peanut storage and treatment plant at Kingaroy.

The Lockyer district was fortunate in experiencing good, useful rains during October and early November, and crops are now to be seen in all stages of growth. Haymaking is in full swing and the early maize crop is fairly promising and should yield at least a three-quarter crop. The early crop of pumpkins is generally light, but the later planted areas should give a more satisfactory return.

In the Harrisville district many of the early sown crops failed on account of the dry weather; rain which fell, however, during December entirely altered the position, and lucerne and other crops are now making good progress. Extensive plantings of summer fodder crops, chiefly White Panicum, Japanese Millet, and Sorghum have been made throughout the district. The area under maize is also fairly extensive; it being expected that about 8,000 acres will be cropped. Pumpkins have also been planted extensively, and heavy plantings of potatoes are anticipated for the winter crop.

Very favourable reports have been received from the Pittsworth district, where all classes of fodder crops intended for grazing-off purposes are doing well. Soudan Grass for this purpose has been largely sown. Both the early and late planted maize crops are in fairly satisfactory condition, and the harvesting of lucerne crops has latterly been general.

The Crow's Nest district does not appear to have participated in the early storms. The growth of pastures has been retarded and crops generally have suffered from lack of sufficient rain. Many fields have been lying fallow for some time awaiting sufficient moisture to ensure a satisfactory germination of seed. Generally

speaking of conditions in Southern Queensland, it is to be remarked that a good general rainfall is badly needed in order that pastures and crops may make sufficient headway during warm growing conditions.

### Central and Mackay Districts.

Reports from the Central and Mackay districts indicate that heavy rainfall was experienced at Mackay, Sarina, and Carmilla, and the soil in many places has been over-saturated so much so that crop growth has been retarded. Additionally, it has not been possible to cope with weed growth owing to the sodden nature of the land. From St. Lawrence to Rockhampton the rainfall, although of a patchy nature, has been sufficient to provide abundance of feed. South of Rockhampton to Bundaberg fair rains have fallen; natural pastures are in fair condition, but further rains are required to ensure satisfactory crops of maize, &c.

The Dawson, Callide, Springsure, and Capella districts have all been favoured with useful rains, and the season, particularly in the Emerald-Springsure and Emerald-Clermont districts is exceptionally good. Crop prospects in the Central district are reasonably good for the next three months, and even if the rainfall happens to be of a scanty nature natural feed for dairy stock should be sufficiently plentiful. Crops intended for pig-raising purposes are generally in evidence throughout the Dawson and Callide districts and are making good progress.

So far as dairying is concerned, the condition of the pastures varies considerably through the dairying districts. As a result of storm rains good growth of pastures has resulted, while in other portions, both on the coastal and Downs, the pastures are scant, such areas not having benefited by rains.

The supply of water is generally adequate, but in some localities the dams are getting low.

The condition of stock generally is from fair to excellent; the great majority, however, are in good condition.

More attention is being given to herd testing generally, and it is pleasing to note that the field officers are taking a direct interest in this important branch of the industry. The Hert Testing Staff are at the present time fully occupied with their duties. Field officers report that the introduction of better class dairy bulls is receiving attention, and the Dairy Cattle Improvement Subsidy Scheme has been instrumental in interesting dairy farmers generally in the matter of breeding high class dairy animals.

At the present period the output of dairy products, on the average, is approximately normal. Should rain of a soaking nature fall over the dairying districts in the near future a rapid increase of dairy products will take place, resulting in an output above normal.

In the absence of rain and the high temperature prevailing, it appears that the output of dairy products will decrease as the green succulent pastures require further rainfall to ensure maturity.

The spring and early summer was generally dry through the dairying areas of the State, and early planted fodder crops were a failure. During the latter period of the year electric disturbances resulted in beneficial falls of rain over a good portion of the areas devoted to dairying throughout the State. There are, however, isolated areas on the coast and Darling Downs which have not as yet benefited by a serviceable rainfall. In these places pastures are scant and there is an absence of fodder crops. The falls of rain, the results of electrical disturbances, were of a heavy nature, but general rain is generally needed to ensure ample supplies of natural pasturage and fodder crops for the late summer and autumn period. Owing to an absence of spring and early summer rains the areas usually planted with fodder crops are below the average. The time of planting autumn and winter crops for fodder purposes is approaching and large areas will be seeded.

*AN INSTRUCTIVE JOURNAL.*

*A subscriber at Samarai, Papua, renewing his subscription for a further two years, writes:—"I should like to express my admiration at the excellence of the articles in the Journal from an instructive standpoint, as well as for the continuous improvement in the Journal generally as time goes on."*

# PIG RAISING IN QUEENSLAND.

## SOME ECONOMIC PHASES.

**In this article Pig Raising is dealt with as one of the industries associated with Dairying and Mixed Farming, in which every farmer in Queensland is interested.**

**As with other branches of agriculture, the production of pigs is a business requiring specialised knowledge, though it may appear to the uninitiated there is nothing to be learned about feeding and handling pigs. The business is not one requiring a large capital nor an expensive plant, particularly where it is associated with dairying and general farming; the provision of abundant supplies of suitable foods, a liberal water supply, clean, comfortable accommodation, and necessary utensils are among the principal requirements. To the specialist who intends devoting the whole of his time to pig raising on commercial lines, the business runs along different lines to a combination of cows and pigs.**

**Not alone should careful consideration be given to the financial side of the proposition at the outset, but continuous attention is necessary to factors that determine the profit and loss in the carrying out of the activities. It is particularly these phases that this article seeks to elucidate.**

## ECONOMIC FACTORS.

**The economic factors in pig raising are—**

1. **The man, his methods and capital.**
2. **The farm and the climatic conditions.**
3. **The food supply and its relationship to seasonal rainfall.**
4. **The stock, their care and management.**
5. **The markets and their demands.**
6. **Pig prices and future prospects.**

### Special Attractions of Pig Raising in Queensland.

Climatic conditions in Queensland, while variable in regard to rainfall, are conducive to the production of healthy stock under conditions favourable to early maturity. Dry-farming systems plus suitable varieties of grain have enabled the wheat farmer to largely overcome variable seasons, and on better methods and conservation of food and water the pig farmer must also largely depend.

Other factors worthy of note in the production of pigs are the comparatively small amount of capital required to engage in the business; the ease with which one may enter into or retire from the ranks of pig farmers; the quick and profitable turnover; and the comparative freedom from risk of calamity. If the pigs and piggeries are kept under hygienic conditions such as are favourable to health and the development of animals naturally suited to forced feeding and early maturity, there are not likely to occur any serious avoidable losses.

It is worthy of note also that pigs are particularly healthy in Queensland, and that climatic conditions are equable and specially suited to open-air systems of stock raising. In this regard Queensland compares more than favourably with any other country in the world.

### Systems of Pig Raising in Queensland.

Pig raising in Queensland is usually carried on along the following lines:—

(1) In conjunction with dairy farming in which skim milk, whey, or (in fewer cases) buttermilk, form the major portion of the food used. The system combines the feeding of dairy products and farm-grown crops, and is invariably regarded as the safest and surest road to profit, in the keeping of pigs. More than 90 per cent. of the pork produced in Queensland could be classed as "dairy-fed pork," a food product in universal demand the world over at top price.

(2) Pigs in conjunction with mixed farming, combining the growing of grain (corn, barley, wheat, &c.), green crops and roots, &c. This system, while quite a practicable one, is mostly regarded as carrying more risk than where cows and pigs are combined. There is, however, no reason why the system should not be successful, but it necessitates the cultivation of crops, and in that sense is more dependent upon seasons of liberal rainfall. The system of utilising milch cows to consume grass and green crops in the production of milk, of which a proportion—minus the cream—is used for pig-feeding purposes, appears to be preferred throughout Australia.

(3) Pigs as a special line where fed on buttermilk, grain, greenstuff, &c. This system operates in conjunction with butter factories, and, in fewer instances, in conjunction with cheese factories where supplies of whey are available, and under expert management is a profitable undertaking. The system requires a much wider knowledge of the business and closer detailed attention. It is not, however, likely to expand much as the principal butter factories (with a few exceptions) have now installed machinery to convert the liquid buttermilk into buttermilk powder, a concentrated product in increasing demand and yielding a higher return than the fluid product.

(4) Pigs on farms where they are fed on the waste food from hotels, cafés, manufacturing establishments, produce markets, &c. Though this system of pig feeding is not at present as extensively carried out in Queensland as in the more populous Southern States, there are numerous suburban and metropolitan pig farms. The business under expert control is a highly profitable one, but as in the case of (3) requires a larger capital and a wider knowledge of the methods of feeding and handling. The business is also one necessitating long hours and considerable labour in collecting food and in transport, and is highly specialised. It is often conducted in conjunction with poultry farming. The system includes piggeries conducted by Government Departments at Mental Hospitals and other institutions, and piggeries run in conjunction with butchering establishments.

(5) Stud piggeries associated with dairy farming and commercial pig farming ventures, or on a small scale under the general heading of suburban pig farms, or as a specialised business at Agricultural Colleges and State Experiment Farms. The stud pig business is one requiring a special knowledge, and needs to be conducted on strictly business lines to

be a success. The capital required depends entirely upon the scope of the business, though stud breeding has its limitations, and is more profitable when conducted in conjunction with one of the other systems referred to than as a special line of work. There is, however, ample scope for enthusiastic and capable men to develop this class of pig farming.

(6) Junior Pig Farmers. Included in this section are those enthusiastic and progressive members of Pig Clubs whose operations, while

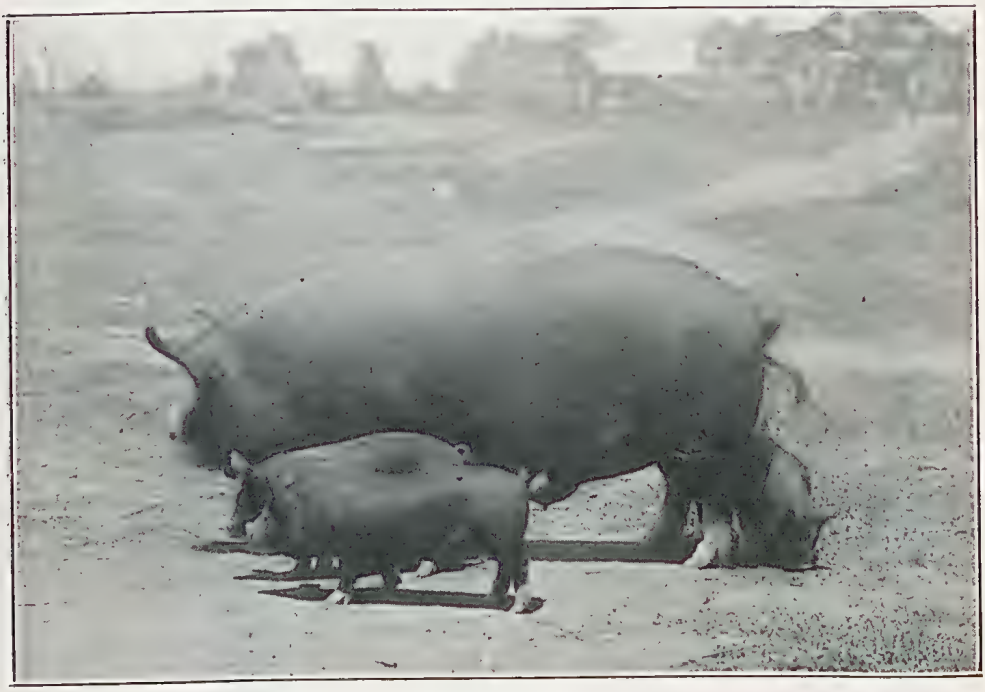

Plate 41.

Fig. 1.—An unprofitable and expensive litter, sometimes referred to as "a pretty but unprofitable lot." Unless breeding sows rear two litters per year of at least eight pigs in each litter, they are not profitable, and should promptly be replaced with more prolific strains. Prolific strains can be obtained if breeders invest in the best it is possible to secure.

conducted on a limited scale, are of importance to the industry. As the Pig Club movement expands thousands of club members will be enrolled, many of whom will eventually enter the ranks of senior pig farmers.

## Number of Breeding Sows Required.

Where pig raising is conducted as an adjunct to dairying, it will be found, as a general rule, that one breeding sow to every ten cows, in milk, will be about the correct proportion to keep. Experience proves that the farmer milking sixty cows comfortably handles six sows and one boar together with young pigs, provided some additional food is grown or purchased to supplement the milk. If accommodation and additional food supplies are available, or if other systems of pig raising are followed, it may be possible to increase the number of pigs kept, but it is better to have food to spare than to lose money by having more pigs than can be comfortably fed and profitably produced.

Pigs should not be used for breeding before they are ten months old, and if carefully handled and kept in reasonable breeding condition both sows and boars should be productive up to the age of six years or even eight years.

### The Importance of Correct Feeding.

The whole subject of foods and feeding is of very great importance to the farming community. The Department of Agriculture and Stock has in course of preparation a complete treatise on this important subject.

*Milk.*—Skim milk, butter-milk, and whey are all excellent foods for the purpose of pig feeding, but their value may be considerably enhanced by balancing them up with concentrated foods, mineral matters, and greenstuff. Clean drinking water in a separate trough is always necessary even where these by-products of the dairy form part of the food.

*Greenfoods.*—Succulent greenstuff should form from 25 to 30 per cent. of the food supply at all seasons of the year, and where green food is not available, lucerne hay or lucerne chaff (soaked in water when first being used) should be substituted. Green lucerne, rape, barley, wheat, oats, sorghums, green cornstalks, pumpkins, melons, grasses, &c., are all advised.

*Root Crops.*—Of these, sweet potatoes, artichokes, unmarketable English potatoes, and mangel wurzels are recommended as being reliable, nutritious, and economical additions to the list of foods. Peanuts may be used in the feeding of very young pigs and breeding stock, but should be omitted from the rations of fattening pigs.

*Grain Crops.*—Corn, wheat, barley, oats, peas, grain sorghums, &c., are all advised together with the meals resultant from grinding these grains (maize meal, wheat meal, barley meal, pea meal, pollard, bran, milo meal, &c.), but care should be taken not to feed an excess of fattening food such as maize, peanuts, or even milk, otherwise the pork and bacon may be too fat and of much lower value than would be the case if balanced rations were fed. Even pigs of correct factory weights are often over-fat and unsuited to trade requirements. *This is a point that must not be overlooked.*

*Concentrated Foods, Meals, and Mineral Mixtures.*—Meals such as protein meal, meat and bone meal, specially prepared pig meal, &c., all provide useful and necessary supplements to the foods used, those supplying protein (flesh formers) being specially advised. Mineral mixtures supplying bone-forming elements (lime, potash, phosphates, &c.), charcoal, wood ashes, bone meal, &c., become more necessary every year, and are, without doubt, very profitable additions to the daily food supply. Other foodstuffs such as molasses, lime water and linseed meals have a place, too, but need to be used judiciously, otherwise unnecessary waste will result.

*Vitamins* (health and energy producers).—These must be supplied per medium of balanced rations in which green foods have a part.

*Water.*—A permanent supply of *clean drinking water* is absolutely essential for all classes of live stock.

## Notes on Feeding.

Pigs have big appetites; they must consume large quantities of nutritious food to enable them to develop and mature early, for with a capacity as baconers to reach 170 lb. live weight in 170 days from birth (birth weight about 2 lb.), and with a ratio of approximately 4 to 5 lb. of food (dry matter) plus water to each pound of pork produced, it will be seen that the modern "pork-making machines" must be fed. It is a mistake to think that pigs can be produced at a profit at no cost at all. The farmer should keep books and ascertain just how he stands in regard to these matters. Seasonal conditions would not hinder our

Plate 42.

Fig. 2.—Early maturing bacon pig, of a mellow desirable type, and of correct factory age and weight. Note evenness of development—light forequarter and fine quality skin and hair, indications of a healthy vigorous constitution. Pigs such as this will always realise top price. Live weight 170 lb. at six months of age.

progress if we conserved food and water and worked more along sound progressive lines.

Ask for the pamphlets on "Foods and Feeding," "Stock Foods," &c., to be supplied to you as soon as available.

## Breeding for Profit.

Efficient management is an important factor in the success of every business, and as a business pig raising must be conducted efficiently to be profitable. No other than purebred boars should be used, and the brood sows should carry all the breeding possible! If they are purebred so much the better. Mongrel stock pay no profits.

Good quality breeding sows are procurable (January 1929) up to twelve months of age at from £3 13s. 6d. at twelve weeks to about £12 12s. each. The higher-priced animals would probably be quoted as being in-pig, twelve months in age, and right at the productive stage. Pedigreed boars of the various breeds are available at from £4 14s. 6d. at twelve

weeks old to £12 12s. or more at twelve months old. Specially selected animals at higher prices than these may also be obtained.

It has been said that "Half the Breeding is in the Feeding," though it would be equally true in pig breeding to add that it is impossible to expect good results from feeding inferior quality, slow-growing strains of pigs. A good sow mated to a superior quality boar will produce pigs worth twice as much as those produced by mongrel stock, while cost of production is lower in the former than in the latter. It is not to be expected that pigs will grow rapidly and produce profitable returns unless improved breeding and selection go hand in hand with correct feeding and management.

Breeding sows should produce two litters per year of at least eight pigs in each litter. Assuming that a sow rears six pigs in each litter, and that these pigs are worth £3 10s. each as bacon pigs when between five and six months of age, a gross return of £21 per litter or £42 per sow per year after the first year should be possible, and at the end of the year the sow herself should be carrying another litter of pigs worth practically £1 each at birth.

**IT DOES NOT PAY TO HANDLE INFERIOR TYPES OF PIGS.**

But many pig raisers are keeping unprofitable sows. There is big scope for improvement here.

The pig industry suffers considerable economic loss each year through the retention on farms of unsatisfactory breeding sows, i.e., sows only producing one litter of less than eight pigs per year instead of two of more than eight each, and through the use of crossbred, mongrel, lazy, and unproductive boars.

*Special Note.*—Unfortunately many farmers depend upon the purchase of store pigs, and for these, at times, high prices are paid, and the margin of profit is considerably reduced. It is desired to advise producers against relying unduly upon the fattening of store pigs for profit, and to stress the value of breeding the pigs on the farm. The purchase of store pigs at comparatively high prices for sale later as baconers at an uncertain value is not in the best interests of the producer nor the business, nor are the risks involved to be recommended.

Experience in Queensland proves that where pig raising is conducted on proper lines it is a profitable undertaking; it indicates that the business is one from which farmers in every part of the country are making satisfactory returns.

### Care of Young Pigs.

The profitable pig should grow rapidly, mature early, and reach the bacon factory at the earliest possible age, at the lowest cost of production, with the least amount of labour, and with the maximum of saleable meat and a minimum of waste.

The business of the pig farmer is to help the pigs in their progress from birth to factory, and to market them in the most attractive and desirable form.

The time to begin caring for pigs is long before they are born, for the strength and development of the pigs at birth depends entirely upon the feed, care, and attention given to their mothers, and the type and quality of the sires. The Departmental pamphlets dealing with "Selection of Boar and Sow," "Feeding the Pig," "Weaning the Pig," "Castration of Pigs," &c., all carry much valuable information on this phase of the business, and to these pamphlets readers are referred. The pamphlets are free on request at the Department of Agriculture and Stock, Brisbane.

## DISEASES OF PIGS.

### Prevention is Better than Cure.

The factor of importance in the ultimate profit to the individual pig raiser concerns the exercise of care in the prevention of disease. The ravages of Swine Fever and Foot and Mouth Disease, &c., in other parts of the world indicate the absolute necessity for strict attention to hygiene, and to keeping nothing but the healthiest animals obtainable under conditions as near perfect as possible. Fortunately, stock in this country are exceptionally healthy, our conditions favour quick growth and early maturity, and we have but little fear of calamity through the more serious infectious and contagious diseases.

Losses through disease and parasitic infestation are, however, sufficiently serious to warrant the closest investigation and to require that the strictest measures be observed in all operations associated with the business.

Investigations into the incidence of disease among pigs are undertaken by veterinary officers of the Department of Agriculture as required from time to time, the object being to definitely locate the origin and whereabouts of the principal diseases among pigs.

These investigations are followed up by visits of Departmental officers to the farms upon which the diseased animals were located. Reports and "Follow up" correspondence with the farmer aim at clearing up the troubles and freeing the stock and farm of disease. A pamphlet dealing with "Diseases of the Pig" and suggested lines of preventive measures and treatment is in course of preparation. **Ask for a copy to be posted to your address as soon as available.** Write the Department at once if you experience any trouble amongst your pigs.

### Proper Housing will Aid in Profit Making.

The pig has frequently been designated as the "gentleman who pays the rent," "the mortgage lifter," &c. The appellations have much truth in them. The pig *is* a money maker, but the "gentleman who pays the rent" is too often left without a house or paddock for himself although he is expected to pay the rent for his owner. Time was when "wallowing in the mire" was deemed to be the natural environment and preference of the pig, and nothing more was deemed necessary or desirable. Times have changed, and to-day there is no greater fallacy than that the pig's natural environment is in a filthy, dark, low, ill-ventilated dungeon. The fact is that, in pig raising as in other avenues of life, "Cleanliness is next to Godliness," and is an absolute necessity in any system of pig farming. With climatic conditions as they are in Queensland expensive pigsty accommodation is unnecessary; it is much more profitable to spend the money on the purchase of wire-netting, barbed wire, and cheap, convenient, comfortable open-fronted shelter-sheds than on the more elaborate pigsties thought so necessary years ago and still an advantage in colder countries. Pig paddocks, not pig

**Our slogan should be not necessarily more, but**
**BETTER PIGS ON EVERY FARM.**

yards or pens, should be the objective, for even pigs being topped up for the market will finish off much better if allowed liberal exercise and green foods than if penned up continuously and fed chiefly on grain. Breeding sows should not be penned up continuously, but should have large grassy paddocks in which to graze. It is, however, an advantage to confine very young pigs in roomy pens; also sows with very young litters. Write to the Department of Agriculture and Stock for information relative to these matters, and state the conditions under which your pigs are being controlled.

### Losses in Transit.

It is not sufficiently realised that the profits from the breeding and feeding of pigs on the farm may be seriously reduced by careless handling and by bruising. Though the pig has a stubborn temperament and is not always ready and willing to travel in a direction contrary to his liking it is surprising how readily he may be handled if those in charge have patience and avoid reprisals. A visit to the bacon factory and inspection of bruised and damaged carcasses, hams, &c., impresses one with the necessity for care in handling, for there one notices hams and flitches showing distinct evidence of boot and whip marks and other injuries to the flesh which, in the aggregate, result in heavy financial loss to the producers. Visits by parties of farmers to bacon factories for the purpose of becoming more conversant with all these details are strongly recom-

mended. The instructors will accompany such parties if advised in ample time beforehand. Every farmer should make a point of coming into personal contact with those who are engaged in the manufacture and sale of the product from the stock they are producing. The system of transport of pigs organised by the Northern Pig Board in Queensland

**SEVEN POINTS ON COST REDUCTION.**

**As it is essential that the costs of production be kept at the lowest possible level the attention of readers is drawn to seven points in cost reduction, all of which have a direct bearing on control of the business on the farm.**

**Reduce your production costs by—**

**(1) The growth and use on the farm of as large a proportion of the food supply as is possible.**

**(2) The use of a liberal supply of flesh- and bone-forming materials, as well as fat formers; we invariably use too much cob corn (grain) and too little green corn (greenstuff). The pigs on most farms have too limited a supply of drinking water, greenstuff, and mineral matters; add these to the ration and mark the difference.**

**(3) Allowing the young pigs to suckle the sow till they are at least eight weeks old, in preference to weaning them at six weeks. This is well worth a trial. Castration of male pigs before weaning is strongly advised.**

**(4) Keeping only the most prolific sows and those that produce the most milk—cull out the weedy, unproductive sorts, the non-rent payers. Three good sows are better than six mongrels. Pigs are only rent payers when bred and fed along the correct lines.**

**(5) Keeping a purebred boar, selected from prolific, "milky" strains of healthy well developed stock. This applies also to sows. It is an unfailing axiom of stock breeding that "Like produces Like."**

**(6) Remembering that the more pigs reared per litter and the more pigs reared per sow per year, the cheaper the cost of production of those marketed.**

**(7) Raising pigs of the most desirable quality within the desired weights, marketing them at the earliest possible age and with a minimum of waste.**

**Explanatory Note.**

**It should be noted that the terms "Cost of Production" and "Cost Reduction" do not necessarily refer only to cost of feeding or to the value of the foods consumed; there are other economic factors influencing production costs.**

is worth emulation. The Board has reduced costs of transport and losses in transit to a minimum without any inconvenience to the producers. In transport exists a field for organised co-operation of pig raisers in other parts of the State.

There is an economic loss to the industry through railway pig vagons travelling long distances carrying fewer pigs than their maximum capacity allows. In the transport of pigs by rail (loose in wagon)

half or full truck rates invariably apply; if a pig wagon with a capacity of seventy bacon pigs carries say, only fifty pigs, this number of animals is charged for at the full truck rate (seventy pigs) and the cost of freight per pig is 25 per cent. higher than it ought to be. Similarly, if ninety pigs are delivered to the railway station for trucking to the one destination on the same day, two pig wagons would have to be utilised, and in this case one full truck (seventy pigs) and one half truck (thirty-five pigs) would be charged for and ninety pigs would pay the freight ordinarily paid for 105 head. There is also less damage through bruising when pig wagons are loaded to their maximum capacity than is the case where fewer animals are forwarded. This suggests the advantages of greater effort in the direction of co-operative trucking. An appreciable saving in freight and loss reduces cost of production and increases the profits.

The loss to the industry through bruising and damage in transit and through condemnation at slaughter, in part or whole, also increases the cost of production of the stock marketed to a considerable extent and necessarily reduces profits. These and other avoidable losses are often overlooked by the producer on the farm. Farmers should consult their factory representatives regarding all these matters.

## What Pig Industry Statistics Teach.

The latest figures available indicate that the human population and the numbers of pigs in some of the principal pig-raising countries throughout the world are approximately as follows. The percentage of pigs per cent. of human population is stated in the fourth column.

PIG-RAISING STATISTICS.
(From Stateman's Year Book for 1928.)

| Name of Country. | Number of Pigs. | Number of Inhabitants. | Number of Pigs per cent. of population. |
|---|---|---|---|
| Denmark | 3,728,623 | 3,434,555 | 108·56 |
| United States of America | 58,969,000 | 105,720,620 | 55·77 |
| Canada | 4,470,771 | 8,788,483 | 50·87 |
| Irish Free State | 1,177,637 | 2,972,800 | 39·61 |
| New Zealand | 520,143 | 1,344,384 | 38·69 |
| Germany | 22,880,318 | 63,180,619 | 36·21 |
| South America | 20,652,000 | 66,512,885 | 31·04 |
| Hungary | 2,386,664 | 8,457,852 | 28·21 |
| Spain | 5,267,328 | 22,290,162 | 23·63 |
| Yugoslavia | 2,806,182 | 12,017,323 | 23·35 |
| Queensland | 191,947 | 897,419 | 21·38 |
| Tasmania | 38,906 | 210,529 | 18·48 |
| West Australia | 69,798 | 385,043 | 18·12 |
| Victoria | 284,271 | 1,726,445 | 16·46 |
| New South Wales | 332,921 | 2,361,950 | 14·09 |
| South Australia | 79,108 | 570,900 | 13·85 |
| Great Britain and North of Ireland | 3,124,412 | 45,448,000 | 6·87 |

The figures quoted above are from the latest information available though it does not follow that they represent the census for the same period throughout.

The figures indicate the possibilities of the pig-raising industry if judiciously organised and controlled; they also emphasise that in comparison with the development that has taken place in other countries, the industry is as yet in its infancy in Queensland, this, especially so, considering the vast tracts of fertile country not yet in a productive stage from the pig farming point of view. Denmark, it will be noted, is in reality, the most important pig-raising country in the world, for with a human population approximately 50 per cent. less than Australia she has more than five times the number of pigs per cent. of human population than we are credited with. Here is emphasised the value of pig raising as an adjunct to dairying in centres suited to a combination of these two important branches of farming. Denmark's success should be an incentive to Australians to make still further progress, though here it would be well to remark that in advocating expansion of the industry we do so with the full knowledge that it is essential to improve the quality if quantity is to be increased.

## Some Notes on Production and Consumption.

Experience in Queensland proves that, following on any dry spell in the weather, there is invariably a rapid return to normal conditions and appreciably increased production during periods characterised by liberal rainfall.

Adverse seasonal conditions constitute one of our greatest problems, but as they are inseparable from agricultural development in sub-tropical countries they must be taken into account, and in consideration of our problems must of necessity be faced. Other industries both agricultural and industrial have their "ups and downs," and in this respect the pig farmer is no better or no worse than his neighbours; **increased efficiency and reduced costs of production together with more co-operative** effort in the manufacture and distribution of the finished products will always prove of immense advantage no matter in what condition the pork products market may be.

From a study of available statistics the position appears as follows:—

In 1926-27 the bacon and ham produced in Australia totalled 73,634,888 lb.; the exports were 1,833,832 lb. and imports 374,824 lb., leaving a surplus of 1,459,008 lb. of exports over imports. The total consumption requirement for the Commonwealth, therefore, was 72,175,880 lb. or on an average 12·05 lb. per head of population. The total exports exceeded the imports by 1,459,018 lb. An increased consumption of slightly more than 3 oz. per head of population per annum would absorb the whole of the surplus production.

This increased consumption necessitates better pork products, the quality of which is contingent upon the class of pig raised. An all round improvement in quality is therefore necessary to insure future success and expansion. Increased local consumption also means less surplus and more reliable prices for the products available.

According to the Commonwealth Statistician, of the total of 244 lb. of meat, which every Australian consumes during the year, only 11 lb.

PLATE 43.

FIG. 3.—Carcass of bacon pig reduced in value more than 50 per cent. through over-feeding and holding the pig too long on the farm. Bacon pigs of this description were in demand many years ago, but during recent years they have become exceedingly unpopular and unprofitable. Note short, thick-set body, heavy forequarter, and short "bully" neck.

PLATE 44.

FIG. 4.—In striking contrast to Fig. 3 this prime quality fleshy bacon pig realised top market rates, and is in much demand throughout Australia. Note increased length of body, evenness throughout, and large proportion of lean to fat. There need be no fear of over-production of the correct type and weight in bacon pigs.

consists of bacon and ham, and 7 lb. of pork and lard. During the same year the same Australian consumes 158 lb. of beef and 68 lb. of mutton and lamb. The average Canadian consumes 87 lb. and the American 77 lb. of pork products each year in addition to other meats. This indicates that there are thousands of homes here that rarely serve pork products in their dining-rooms, and impresses upon those interested in pig production the possibilities ahead of the industry when Australians can be induced by improvement in quality of the products to consume more pork, bacon, ham, &c.

Quality dominates the position in any market, hence quality products should be the dominant factor with every individual farmer engaged in developing the industry, and with every unit engaged in manufacture and distribution. We must modernise our methods if we are to expand.

It is quite certain also that if the supply of suitable pigs to the various factories were more regular and of more reliable and suitable type better values would be obtained at all seasons of the year.

There is no reason why Australia should not be self-contained so far as the raising and consumption of its pig products are concerned.

### Market Requirements Paramount.

The paramount consideration in the maturing of pigs is the market requirement. Pig raisers producing pigs of weights, quality and condition other than those especially required are losing money. From the table figuring out the market classification of pigs and factory values it will be noted that there are different grades, all of which vary both in age and in weight as well as in commercial value. **It certainly does pay to study market requirements and to be fully informed as to the correct age, weight, condition, and value.** There is more need to-day than at any previous stage in our history for a careful study of the requirements of the various markets, for competition is keen, market demands urgent, and the consumers more determined that they will only buy and pay for such goods as suit their own particular fancies. The consumers' demands must be catered for if the business is to become a profitable one. In the marketing of pork and bacon pigs there is no demand for very heavy, fat pigs of any description.

Boars or stags with long sharp tusks, rigs, ruptured stock, rough staggy pigs, cripples, aged and worn-out sorts, wild or bush pigs, thin, weak, rickety, damaged or diseased animals, or huge, over-fat, and very coarse pigs **are of no value at all, and should not be sent in or offered for sale. It does not pay to feed or handle such stock no matter how cheap they appear to be at auction or by private contract.**

Purchasers are only attracted by quality pigs of the most desirable type. **One prominent manufacturer recently remarked at a public gathering in Brisbane that 50 per cent. of the pigs coming forward to Queensland bacon factories were too fat and too heavy to realise top**

prices. In this direction producers must surely be at fault, and they cannot expect all-round top prices if so large a percentage of pigs are not of desired condition and weight. Further particulars in regard to prices, conditions of sale, &c., may be obtained on application to the managers of the various factories.

**QUEENSLAND BACON FACTORIES.**

| Name. | Factory at |
|---|---|
| Conaghan Bros. Ltd. .. .. | East street, Rockhampton. |
| Darling Downs Co-operative Bacon Company, Ltd. .. .. | Willowburn, via Toowoomba. |
| Foggit Jones Pty, Ltd. .. .. | Oxley, near Brisbane. |
| Huttons, J. C., Pty., Ltd. .. | Zillmere, near Brisbane. |
| North Queensland Co-operative Bacon Company, Ltd. .. .. | Floreat Siding, Mareeba, North Queensland. |
| Queensland Co-operative Bacon Association, Ltd. .. .. | Murarrie, near Brisbane. |
| Reeds, Ltd. .. ... .. .. | Ann street, Maryborough. |
| Warwick Bacon Company .. | Mill Hill, near Warwick. |

## Marketing Pigs in Queensland.

This trade classification of the various grades of pigs has special reference to average age and weight in Queensland, and may be accepted as a reliable guide in the marketing of this class of stock.

Trade Classification—Queensland Pigs.

| Name or Grade of Pig. | Approximate Age. | Approximate Weight. |
|---|---|---|
| Sucker or Sucking Pig .. | 6 weeks .. .. | 25 lb., live weight |
| Weaner .. .. .. | 8 weeks .. .. | 35 to 40 lb., live weight |
| Slip .. .. .. | 10 weeks .. .. | 45 lb., live weight |
| Store .. .. .. | 12 to 14 weeks .. | 55 to 65 lb., live weight |
| Light Porker .. .. .. | 4 months .. .. | 65 to 75 lb., live weight |
| Medium Porker .. .. | 4½ months .. .. | 85 to 95 lb., live weight |
| Heavy Porker .. .. .. | 5 to 5½ months .. | 115 to 135 lb., live weight |
| Light Baconer, Prime .. | 5 to 5½ months .. | 115 to 135 lb., live weight |
| Medium Baconer, Prime .. | 5½ to 6 months .. | 140 to 170 lb., live weight |
| Heavy Baconer, Prime .. | 6 to 6½ months .. | 170 to 175 lb., live weight |
| Heavy Baconer .. .. | Over 6 months .. | 175 to 185 lb., live weight |
| Heavy Baconer .. .. | Over 6 months .. | 185 to 197 lb., live weight |
| Heavy Baconer .. .. | Over 6 months .. | 197 to 216 lb., live weight |
| Backfatter .. .. .. | Up to 4 or 5 years .. | Up to 4 cwt., dressed weight |
| Stag .. .. .. | Up to 4 or 5 years .. | Various weights |
| Chopper .. .. .. | Up to 2 years or more | Up to 3 cwt., dressed weight, or heavier |
| Boars .. .. .. | Over, say, 4 to 6 months | These are unmarketable as meat pigs |

Values for these various grades of pigs vary considerably with age, quality, condition, weight, from around 12s. 6d. for a sucking pig up to

£3 10s. or more for prime quality baconers. For bacon pig values current in Queensland in February, 1929, see bacon factory buying charts featured hereunder.

*CO-OPERATIVE BACON FACTORIES BUYING CHART, QUEENSLAND, 4TH FEBRUARY, 1929.

NOTE.—Live weight column not included in this chart.

| Actual Dressed Weight. | Rate per lb. | Value per Pig.† | Actual Dressed Weight. | Rate per lb. | Value per Pig. |
|---|---|---|---|---|---|
| | d. | £ s. d. | | d. | £ s. d. |
| 86 lb. .. | 6 0 | 2 3 0 | 124 lb. .. | 6·77 | 3 10 0 |
| 87 lb. .. | 6·10 | 2 4 3 | 125 lb. .. | 6·72 | 3 10 0 |
| 88 lb. .. | 6·25 | 2 5 10 | 126 lb. .. | 6·57 | 3 9 0 |
| 89 lb. .. | 6·40 | 2 7 6 | 127 lb. .. | 6·47 | 3 8 6 |
| 90 lb. .. | 6·50 | 2 8 9 | 128 lb. .. | 6·37 | 3 8 0 |
| 91 lb. .. | 6·60 | 2 10 0 | 129 lb. .. | 6·27 | 3 7 6 |
| 92 lb. .. | 6·70 | 2 11 4 | 130 lb. .. | 6·18 | 3 7 0 |
| 93 lb. .. | 6·80 | 2 12 8 | 131 lb. .. | 6·09 | 3 6 6 |
| 94 lb. .. | 6·90 | 2 14 0 | 132 lb. .. | 6·0 | 3 6 0 |
| 95 lb. .. | 7·0 | 2 15 5 | 133 lb. .. | 5·90 | 3 5 6 |
| 96 lb. .. | .. | 2 16 0 | 134 lb. .. | 5·82 | 3 5 0 |
| 97 lb. .. | .. | 2 16 7 | 135 lb. .. | 5·74 | 3 4 6 |
| 98 lb. .. | .. | 2 17 2 | 136 lb. .. | 5·64 | 3 4 0 |
| 99 lb. .. | .. | 2 17 9 | 137 lb. .. | 5·51 | 3 3 0 |
| 100 lb. .. | .. | 2 18 4 | 138 lb. .. | 5·39 | 3 2 0 |
| 101 lb. .. | .. | 2 18 11 | 139 lb. .. | 5·26 | 3 1 0 |
| 102 lb. .. | .. | 2 19 6 | 140 lb. .. | 5·14 | 3 0 0 |
| 103 lb. .. | .. | 3 0 1 | 141 lb. .. | 5·01 | 2 19 0 |
| 104 lb. .. | .. | 3 0 8 | 142 lb. .. | 4·90 | 2 18 0 |
| 105 lb. .. | .. | 3 1 3 | 143 lb. .. | 4·78 | 2 17 0 |
| 106 lb. .. | .. | 3 1 10 | 144 lb. .. | 4·66 | 2 16 0 |
| 107 lb. .. | .. | 3 2 5 | 145 lb. .. | 4·55 | 2 15 0 |
| 108 lb. .. | .. | 3 3 0 | 146 lb. .. | 4·44 | 2 14 0 |
| 109 lb. .. | .. | 3 3 7 | 147 lb. .. | 4·32 | 2 13 3 |
| 110 lb. .. | .. | 3 4 2 | 148 lb. .. | 4·21 | 2 12 0 |
| 111 lb. .. | .. | 3 4 9 | 149 lb. .. | 4·10 | 2 11 0 |
| 112 lb. .. | .. | 3 5 4 | 150 lb. .. | 4·0 | 2 10 0 |
| 113 lb. .. | .. | 3 5 11 | 151 lb. .. | 3·89 | 2 9 0 |
| 114 lb. .. | .. | 3 6 6 | 152 lb. .. | 3·78 | 2 8 0 |
| 115 lb. .. | .. | 3 7 1 | 153 lb. .. | 3·68 | 2 7 0 |
| 116 lb. .. | .. | 3 7 8 | 154 lb. .. | 3·58 | 2 6 0 |
| 117 lb. .. | .. | 3 8 3 | 155 lb. .. | 3·48 | 2 5 0 |
| 118 lb. .. | .. | 3 8 10 | 156 lb. .. | 3·38 | 2 4 0 |
| 119 lb. .. | .. | 3 9 5 | 157 lb. .. | 3·28 | 2 3 0 |
| 120 lb. .. | .. | 3 10 0 | 158 lb. .. | 3·19 | 2 2 0 |
| 121 lb. .. | 6·94 | 3 10 0 | 159 lb. .. | 3·10 | 2 1 0 |
| 122 lb. .. | 6·88 | 3 10 0 | 160 lb. .. | 3·0 | 2 0 0 |
| 123 lb. .. | 6·82 | 3 10 0 | | | |

* Chart published by courtesy of the Queensland Co-operative Bacon Association, Limited, Murarrie, Q.

† These prices are for prime quality bacon pigs only, as delivered to the Queensland Co-operative Bacon Association Factory at Murarrie, Q., and are based on the actual dressed weight of the animal after the carcass has been allowed to cool off. Pigs other than prime are paid for on a weight and quality basis, at the discretion of the factory directorate.

* Proprietary Bacon Factories, Queensland.

Schedule of Weights and Prices for Prime Quality Bacon Pigs, in operation as at 4th February, 1929.

| Actual Live Weight. | Estimated Dressed Weight. | Rate per lb. | Value per Pig† | Actual Live Weight. | Estimated Dressed Weight. | Rate per lb. | Value per Pig† |
|---|---|---|---|---|---|---|---|
| | | *d.* | | | | *d.* | |
| 135 | 90 | 6·50 | 2 8 9 | 176 | 126 | 6·57 | 3 9 0 |
| 136 | 91 | 6·60 | 2 10 0 | 177 | 127 | 6·47 | 3 8 6 |
| 137 | 92 | 6·70 | 2 11 4 | 178 | 128 | 6·37 | 3 8 0 |
| 138 | 93 | 6·80 | 2 12 8 | 179 | 129 | 6·27 | 3 7 6 |
| 139 | 94 | 6·90 | 2 14 0 | 180 | 130 | 6·18 | 3 7 0 |
| 140 | 95 | 7·0 | 2 15 5 | 181 | 131 | 6·09 | 3 6 6 |
| 141 | 96 | .. | 2 16 0 | 182 | 132 | 6·0 | 3 6 0 |
| 142 | 97 | .. | 2 16 7 | 183 | 133 | 5·90 | 3 5 6 |
| 143 | 98 | .. | 2 17 2 | 184 | 134 | 5·82 | 3 5 0 |
| 144 | 99 | .. | 2 17 9 | 185 | 135 | 5·74 | 3 4 6 |
| 145 | 100 | .. | 2 18 4 | 186 | 136 | 5·64 | 3 4 0 |
| 146 | 101 | .. | 2 18 11 | 187 | 137 | 5·51 | 3 3 0 |
| 147 | 102 | .. | 2 19 6 | 188 | 138 | 5·39 | 3 2 0 |
| 148 | 103 | .. | 3 0 1 | 189 | 139 | 5·26 | 3 1 0 |
| 149 | 104 | .. | 3 0 8 | 190 | 139 | 5·26 | 3 1 0 |
| 150 | 105 | .. | 3 1 3 | 191 | 140 | 5·14 | 3 0 0 |
| 151 | 105 | .. | 3 1 3 | 192 | 141 | 5·01 | 2 19 0 |
| 152 | 106 | .. | 3 1 10 | 193 | 141 | 5·01 | 2 19 0 |
| 153 | 107 | .. | 3 2 5 | 194 | 142 | 4·90 | 2 18 0 |
| 154 | 108 | .. | 3 3 0 | 195 | 143 | 4·78 | 2 17 0 |
| 155 | 108 | .. | 3 3 0 | 196 | 144 | 4·66 | 2 16 0 |
| 156 | 109 | .. | 3 3 7 | 197 | 145 | 4·55 | 2 15 0 |
| 157 | 110 | .. | 3 4 2 | 198 | 146 | 4·44 | 2 14 0 |
| 158 | 110 | .. | 3 4 2 | 199 | 147 | 4·32 | 2 13 0 |
| 159 | 111 | .. | 3 4 9 | 200 | 148 | 4·21 | 2 12 0 |
| 160 | 112 | .. | 3 5 4 | 201 | 149 | 4·10 | 2 11 0 |
| 161 | 112 | .. | 3 5 4 | 202 | 150 | 4·0 | 2 10 0 |
| 162 | 113 | .. | 3 5 11 | 203 | 150 | 4·0 | 2 10 0 |
| 163 | 114 | .. | 3 6 6 | 204 | 151 | 3·89 | 2 9 0 |
| 164 | 115 | .. | 3 7 1 | 205 | 151 | 3·89 | 2 9 0 |
| 165 | 115 | .. | 3 7 1 | 206 | 152 | 3·78 | 2 8 0 |
| 166 | 116 | .. | 3 7 8 | 207 | 153 | 3·68 | 2 7 0 |
| 167 | 117 | .. | 3 8 3 | 208 | 154 | 3·58 | 2 6 0 |
| 168 | 118 | .. | 3 8 10 | 209 | 155 | 3·48 | 2 5 0 |
| 169 | 119 | .. | 3 9 5 | 210 | 155 | 3·48 | 2 5 0 |
| 170 | 120 | .. | 3 10 0 | 211 | 156 | 3·38 | 2 4 0 |
| 171 | 121 | 6·94 | 3 10 0 | 212 | 157 | 3·28 | 2 3 0 |
| 172 | 122 | 6·88 | 3 10 0 | 213 | 158 | 3·19 | 2 2 0 |
| 173 | 123 | 6·82 | 3 10 0 | 214 | 159 | 3·10 | 2 1 0 |
| 174 | 124 | 6·77 | 3 10 0 | 215 | 159 | 3·10 | 2 1 0 |
| 175 | 125 | 6·72 | 3 10 0 | 216 | 160 | 3 0 | 2 0 0 |

Smallgoods sows 2½d. to 3d. per lb. with 30 per cent. deduction.

* Chart published by courtesy of Stock Agents, Ltd., Brisbane, representing Proprietary Bacon Factories, Q.

† These prices are for prime quality bacon pigs only, as weighed by Proprietary Company's buyer at Country Railway Stations and Trucking Yards. Other pigs are paid for on a weight and quality basis at the discretion of the buyer and the company he represents.

The prices quoted above represent a fair general average value for prime quality bacon pigs within the weights stated on the charts at Queensland bacon factories. In actual practice there would be practically

no deductions from these values under the buying systems common in the Northern State. Rail freights, charges for loading and forwarding, &c., are invariably paid by the Queensland factories, and, as far as is possible, live stock are given preference in quick transport over the railways.

Southern market quotations for pork and bacon as published in the daily and weekly press are invariably subject to heavier deductions due to the different system of marketing. There, in numerous instances, the transport and selling charges approximate 10s. per head more than they do in this State, as per figures quoted above. It is important to bear this in mind when comparing published market reports, as otherwise Queensland prices might be thought to compare unfavourably with those ruling in the Southern States.

While it will be noted that values fluctuate a good deal, and while pigs of one grade might readily be included in another and perhaps better grade, it can be taken as a general rule that the principal demand is for the medium or prime weight animal, whether marketed as porkers or baconers or included in other grades. There is in the North particularly a very limited demand for very light porkers or very heavy, fat pigs. The prime pig in good marketable condition with a firm yet mellow flesh and firm white fat is the one that is most profitable in the meat trade.

Having regard to the general trend of prices it would appear that there is little hope of permanently higher values in Queensland while the human population is so limited. There is all the more reason therefore for the devoting, by the pig raiser, of special attention to the finer points of the business to ensure a remunerative return.

### A Sum in Subtraction for the Pig Farmer.

By sale of—

| | £ | s. | d. |
|---|---|---|---|
| (*a*) One prime bacon pig, weight 120 lb., at 7d. per lb., dressed value .. .. .. .. .. .. | 3 | 10 | 0 |
| (*b*) One very heavy fat pig, weight 160 lb., at 3d. per lb., dressed value .. .. .. .. .. .. | 2 | 0 | 0 |
| Loss in cash through over-fattening (*b*) .. .. .. | 1 | 10 | 0 |
| Plus increased cost of feed, labour, freight, and risk involved in holding (*b*), say .. .. .. .. | 1 | 0 | 0 |
| Total loss incurred through over-fattening pig (*b*) by 40 lb. or more .. .. .. .. .. .. | 2 | 10 | 0 |

The point emphasised here is that **a detailed knowledge of market weights and values is essential in the production of pigs for profit. Without such knowledge the business cannot prove profitable.**

### A Sum in Multiplication for the Pig Farmer.

By utilising the food, time, labour, risk, &c., used in producing the unprofitable pig (*b*) referred to above, showing a loss of more than 1s. per lb. of the surplus fat and weight—in topping up one bacon pig 86 lb. dressed weight, valued at 6d. per lb., £2 3s.—(and not in general demand at all the factories) to prime bacon weight 120 lb., and valued at £3 10s., a net profit (at no additional expense) of 10s. may be gained instead of the loss varying from £1 10s. to £2 10s. after allowing 17s. as the approximate cost of feeding.

Attention is again drawn to the statement made elsewhere to the effect that 50 per cent. of the pigs coming forward are unsuitable for the market. Big losses are being sustained by pig raisers in consequence.

### Weighing the Pigs on the Farm.

The provision on the farm of a properly constructed platform scale and crate with which to weigh the pigs at regular intervals, and especially prior to marketing, is an essential to the success of the business, particularly now that condition and weight are such important items in pig marketing.

A suitable outfit may appear costly and beyond the means of the average farmer, but observation and experience prove its provision to be quite as necessary in the marketing of pigs as are the class of milk

**To raise the consumption of pork products from 12 lb. to 20 lb. per capita in Australia (a very desirable objective) would mean the consumption of 500,000 additional pigs each year if the population stood still. Happily the population does not stand still, it increases at the rate of 200,000 per annum, and with consumption at 20 lb. per capita it would mean a further 40,000 pigs each year.**

**Who is to say this is not possible provided pig raisers enter whole-heartedly into an intensive advertising campaign to tell the consumer what an excellent and nutritious product they have to offer.**

and cream cans recommended in the marketing of these dairy products; the bushel, half bushel, standard and other containers in the marketing of fruit; and the correct type of sacks in the marketing of cereals, &c.

Bacon factories do not purchase pigs now except on an actual weight (live or dressed) and condition basis; nor should the farmer guess the weight and lose money. It is only by having up-to-date equipment in stock, plant, and knowledge that maximum profits may be expected.

A comparison of the prices paid for pigs of the same quality and condition but of varying weights proves enlightening, and demonstrates the urgency of making every possible provision to satisfy the exacting requirements of the markets.

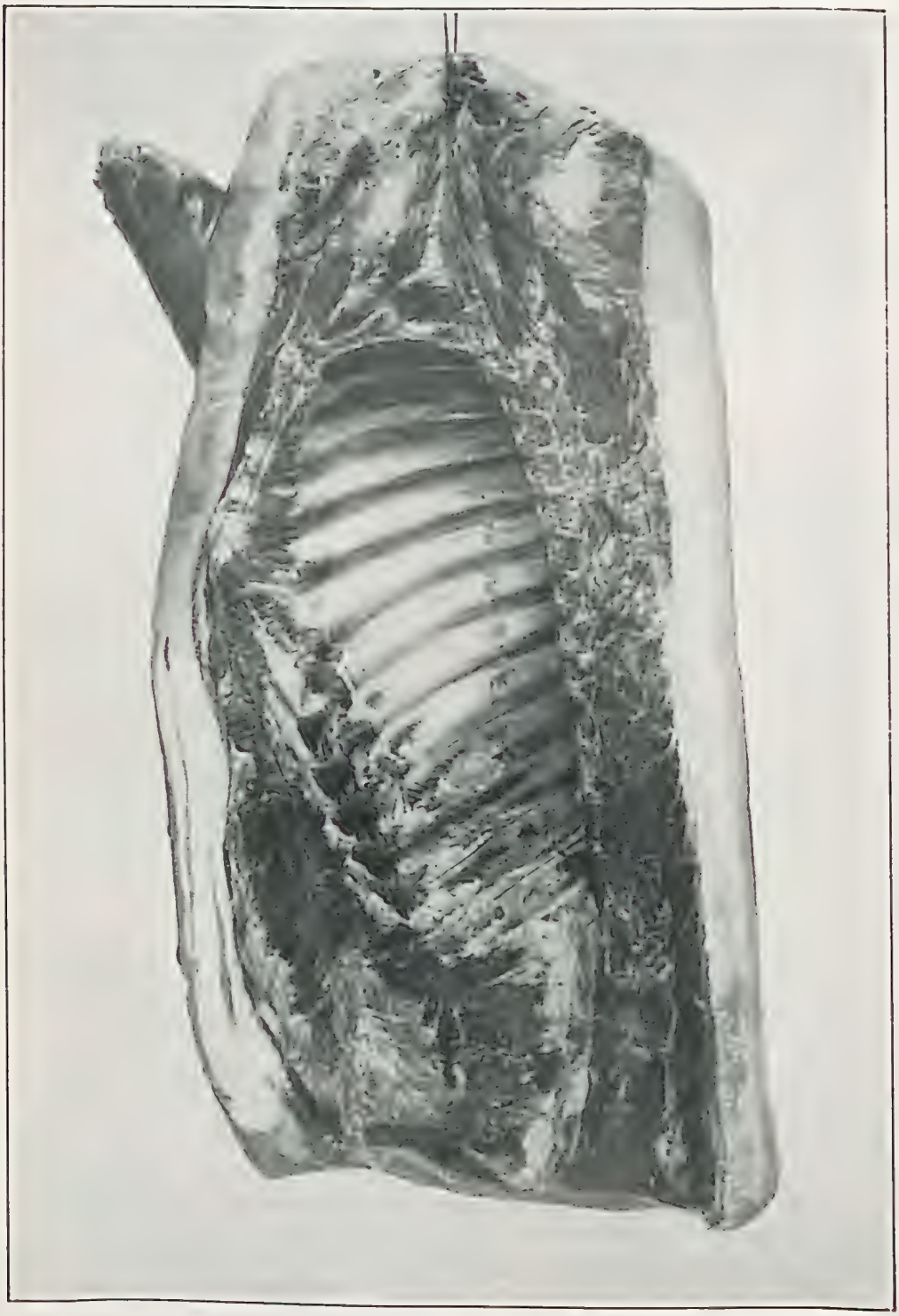

PLATE 45.

FIG. 5.—Heavy, over-fat flitch, much depreciated in value by its weight (36 lb.) and thickness of fat along back. Factories have difficulty in disposing of bacon of this description, even at a considerable discount. It does not pay them, nor is it a good business proposition to the farmer. Study the factory charts and compare prices for confirmation of this statement.

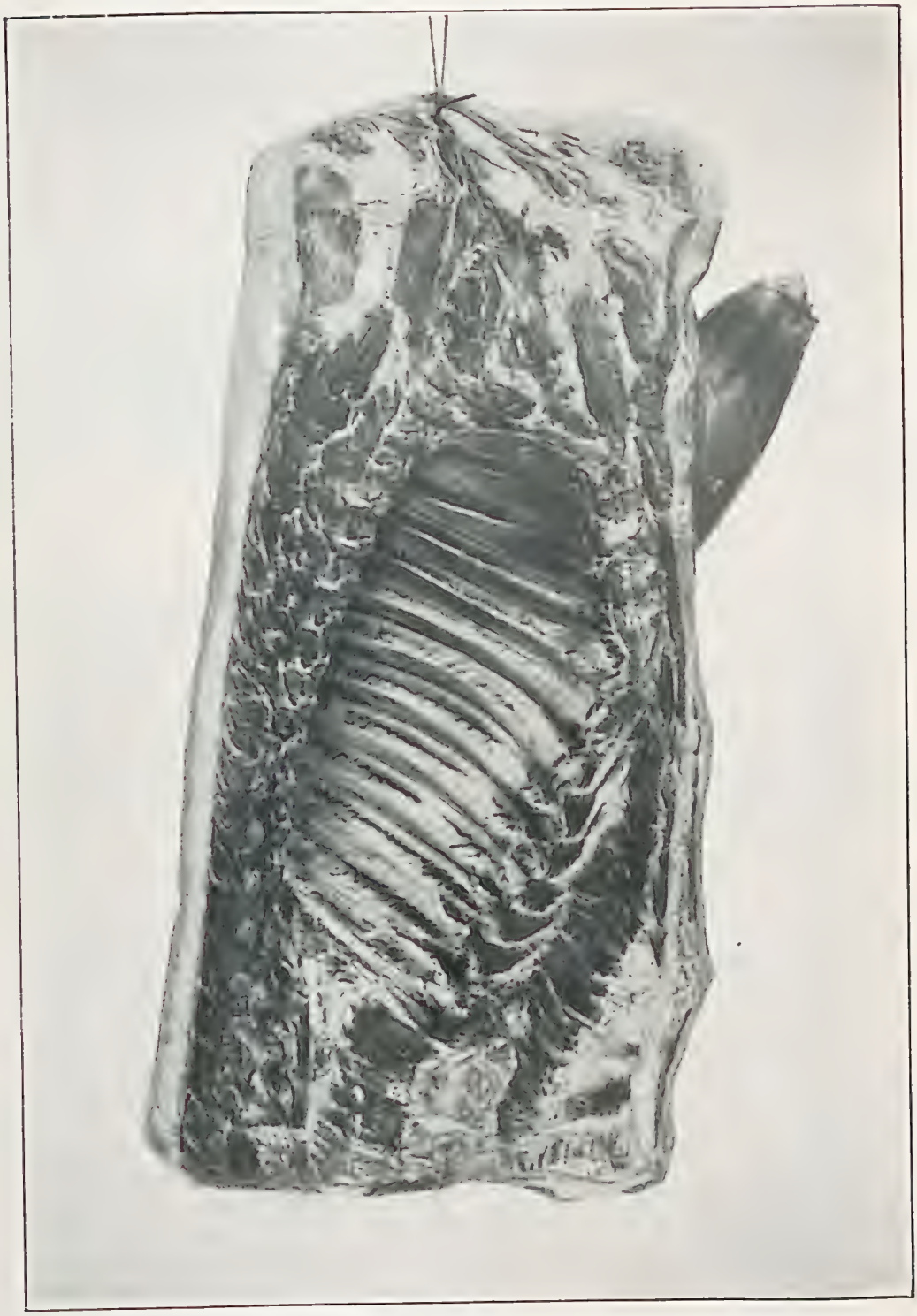

Plate 46.

Fig. 6.—Prime quality, deep-bodied flitch of bacon of good trade weight (27 lb.). Note evenness of fat along back and fleshiness of the flitch throughout. This was from a pig of desirable trade weight and condition. Desirable weight for flitches of bacon is from 24 to 27 lb. each.

## Marketing Organisation.

As will be noted from the data in this pamphlet, there is much in the way of improvement which can be affected at the production end. Attention to marketing requirements by the individual pig raiser is the first step in effective marketing organisation. The helping hand of Departmental officers is available on request, and every assistance will be gladly and willingly rendered. Pig raisers in general should seek to attain the high standard already set by many progressive men engaged in the

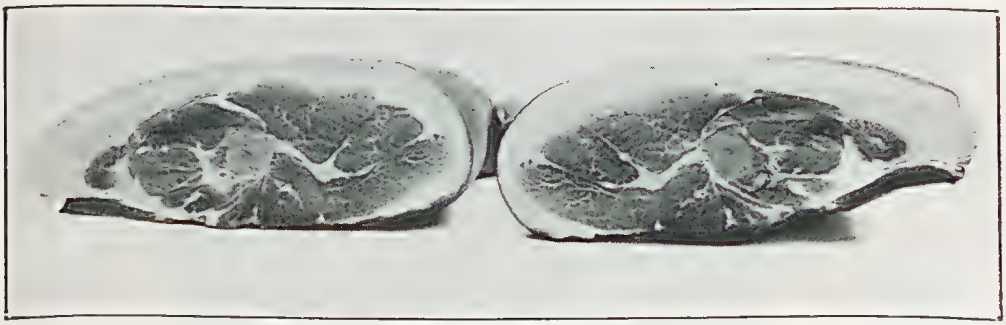

PLATE 47.

FIG. 7.—This ham, while of excellent quality, and with the fat evenly marbled through the lean, was too fat and too heavy for best trade requirements. Its weight, 18 lb., limited its sale to ham and beef shops, restaurants, &c. It does not pay to over-fatten pigs or to market them when over the desired factory weights. Popular factory weights for hams are from 12 to 14 lb. Hams 9 to 10 lb. in weight are not usually prime enough, while those over 14 lb. weight are in poor demand.

industry. Pig raisers on the one hand and bacon curing establishments on the other must realise that their interests are closely related and that they must work in unison in order to ensure the prosperity of the pig-raising industry.

Primary obstacles to improvement in the marketing sphere are as shown herein—first, the irregular supplies of pigs, and second, the large proportion of pigs marketed which are of unsuitable weights. With these obstacles removed by the concentrated effort of the individual pig raiser there will be good ground for closer collaboration by producing interests with the manufacturers in other directions.

An object lesson is to be found in the operations of the Northern Pig Board established in the year 1923 under the agricultural legislation introduced by the Queensland Government. As a result of organised co-operation pig prices in the Northern area are now on a par with those ruling in Southern Queensland, and a new industry has been created. During the year ended 30th June, 1928, the Northern Pig Board handled 9,626 pigs. The pigs produced are allocated as between the pork market and the bacon market, those most suitable for the latter trade being treated by the Co-operative Bacon Factory with which the Pig Pool Board is allied. The return to the Northern pig raiser is the average between the price realised for pork through the butchers within the area, and that available through the bacon market.

There are many directions in which the co-operative enterprise

exemplified in Northern Queensland may be emulated in the Southern part of the State, but the primary consideration at the moment concerns the organising of that part of the business which is within the sphere of the individual pig raiser himself.

### Departmental Officers offer a Helping Hand.

It is with the object of assisting the farmer to become more efficient and to enable him to make more profit out of his pigs that Departmental officers have entered so vigorously into the instructional campaign among pig raisers. The Instructors have spared no effort to place themselves in direct touch with producers and at the same time to work in co-operation with all other branches of the trade. It is satisfactory to note the spirit of confidence thus engendered and to know that pig raisers are looking more and more to the Department of Agriculture and Stock for information and advice as to the best methods of procedure and as to future progress.

### Agricultural Extension Services.

Through the medium of correspondence and personal interviews dealing with every phase of the industry and with the activities outlined above, the services of the Department are made available to farmers in every portion of the State. The "Queensland Agricultural Journal" and the city and country Press provide media through which valuable information is conveyed to the farming community. The aim is to provide every farmer with the most up-to-date information it is possible to secure. The Instructors in Pig Raising invite you to communicate with them regarding your problems, whether they have reference to the control of stock in health or in disease or on any other aspect of the business. **You are urged to avail yourself of their advice and assistance.**

### Official Itineraries and Farm Visits.

The Instructors in Pig Raising travel extensively on itineraries during which personal visits are paid to farmers engaged in pig raising. That these visits are appreciated is clearly indicated by the kindly welcome extended to visiting officers, and by the many friendships formed with the farming community in every district visited.

### Schools of Instruction.

The success of the initial Pig Farmers' School, held at the Queensland Agricultural High School and College, Gatton, in June, 1928, indicates the possibilities ahead of this form of instruction which appeals especially to those of the farming community who have recently left school and have taken their places on the farm; indeed, it appeals to senior farmers also, many of whom are only too pleased to have the opportunity thus afforded, of adding to their knowledge of the industry. **You are invited to write for particulars to the Principal, Queensland Agricultural High School and College, T.P.O. South, Gatton, Queensland.**

## ENCOURAGEMENT OF JUNIOR AND ADULT FARMERS.

### Boys' and Girls' Pig Clubs.

Queensland leads the way in Australia in the development of the Boys' and Girls' Pig Club Scheme. Clubs have been organised and club contests arranged in many districts in the Southern and Central Divisions of the State, and, in due course, clubs will also be in operation in North Queensland. In the development of this scheme officers of the Department of Agriculture and Stock co-operate with officials of the Department of Public Instruction, and their efforts are backed up by enthusiastic club members, local committees, agricultural show societies,

PLATE 48.

FIG. 8.—This junior farmer, whose pigs were penned in a Queensland Pig Club contest, did not have much to spend on pig sty accommodation, but as he promptly replied when asked a question about pig pens, "Well, I like my pig's pen to be roomy and comfortable, so that it is easily kept clean and is cool and airy even on a very hot day." The boy and his pigs certainly look contented, and in each case cool and comfortable.

&c., in the districts in which clubs function. The scheme has boundless possibilities, and from former successes it is evident in years to come that thousands of junior and senior farmers will be trained by the clubs, and will become more efficient farmers as a result of their association with this scheme of practical instruction. These clubs are intensely practical, the rules of membership requiring each club member to secure a suitable pig with which to enter the contest. Provision is made for porkers and baconers of the various grades as well as for stud pigs, and in general each club runs for a period of approximately four months. The scheme allows for visits of Instructors to the homes of the club members for the purpose of an official inspection and for club tours, picnics, contests, meetings, and other formal and informal gatherings.

Club members have been singularly successful in the preparation of porkers and baconers for market and have shown appreciable profits. Those possessing stud pigs have proved that they can compete on even terms in the show ring with farmers having a much wider knowledge of the preparation of stock for show and for sale. A scheme providing for Senior Clubs in which boys and girls who have already left school may enter will shortly be in operation. Write to the Department of Agriculture and Stock, Brisbane, for particulars.

**PIG CLUBS FOR QUEENSLAND BOYS AND GIRLS.**

**If you are interested in the Pig Club Movement, we shall be glad of your co-operation, for it is desirable that clubs should be in operation in every portion of the State suited to this branch of agriculture. All information available at the Department of Agriculture and Stock, and the Department of Public Instruction, Brisbane.**

## General.

The educational propaganda also includes the broadcasting from Station 4QG, Brisbane, of radio talks, a modern avenue through which farmers and their families over a widespread area are reached with beneficial results. Copies of the lecturettes are available on application.

The Queensland Government Agricultural Bank services are at the disposal of settlers engaged in pig raising. Under specified conditions advances are made to cover purchase of stock, &c., repayment being arranged for over a series of years. Full particulars may be obtained from the Manager of the Agricultural Bank, Brisbane.

Suitable breeding stock are made available at very reasonable prices to the farming community from several Government institutions, including the Queensland Agricultural High School and College, Gatton; the Mental Hospitals at Goodna, Willowburn, and Sandy Gallop; the Farm Home for Boys, Westbrook; and the State Farm at Kairi on the Atherton Tableland.

At these studs the stock available are of the best type it is possible to secure, and they are bred along approved lines for high production and profit. Many private breeders are also engaged in the breeding and sale of stud pigs.

**Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.**

# WHEAT CROP COMPETITION—SEASON 1928.

## REPORT OF THE DIRECTOR OF AGRICULTURE, MR. H. C. QUODLING.

Twenty-six crops were entered against fifty-one in last year's competition; fifteen and eleven entries being received from the Toowoomba and Warwick districts respectively. Six of last year's entrants competed again, including two prize winners, but the latter were unsuccessful on the present occasion. A 50 per cent. reduction in entries in such a short period may or may not have much significance, and might be attributable, in part, to a late pronouncement being made respecting the holding of the competition, and to the influence exercised generally on crops by the incidence of the dry weather. If the educational value of such competitions is to be the primary reason for holding them, good grounds exist for the earlier lodgment of entries immediately the planting season is concluded; otherwise, there is a likelihood of a repetition of crops being entered, as many were this year when actually ripe.

As success in any business undertaking is measured by the resultant £ s. d., it follows that the conditions laid down as a basis for a wheat crop competition should deal with fundamentals governing that success. Good cultivation and early and intelligently planned cropping arrangements come naturally within this category.

The opinion is expressed that if a competition is to be held in 1929, the earliest possible pronouncement respecting its conditions should be made, a small quota of the entrance fee might be lodged at time of nomination and the balance at a date to be decided upon.

In submitting the report at the conclusion of last year's competition and referring specifically to the points for "apparent yield," it was suggested at the time that one point might be allotted for each of the first twenty-four bushels and half a point for every subsequent bushel; however, it was decided by the promoters of this year's competition that half a point was to be awarded for every bushel, under this particular heading.

If an analysis of the results of this year's competition were made on the former mentioned basis, it would have had a marked effect on the present results. As far as your judges are concerned they still subscribe to the opinion that by allowing the general scale of points to remain as at present, and adopting last year's suggestion (one point for each bushel of the first twenty-four bushels and half a point for each additional bushel), it would have an effect in assisting to promote the growth of prolific commercial varieties under conditions calculated to encourage the production of wheat on a sound basis.

Another matter having a bearing on future crop competitions was the suggestion made on behalf of growers who cultivate large areas of wheat that two competitions should be run, one for 20 acres as at present and another for 100-acre fields. Our opinion is that large scale operations are deserving of every possible support.

Turning again to this year's competition it will be noted from the schedule of points awarded when judging was carried out, that high yields were anticipated. This fact clearly indicates how important it is for growers seeking greater stability and success in their business to adopt early and thorough methods of cultivation, as these were found to invariably synchronise with high yields. Close observation clearly showed also that capacity to yield was undoubtedly dependent upon the wheat in the early prepared fields having reserve supplies of sub-soil moisture to draw upon during several weeks of dry weather in August and September. Where this moisture was unavailable on late prepared and late sown fields, crop yields suffered accordingly.

Plate 49.—Bending Low with its Weight of Grain.

With this Crop of "Pusa," Mr. W. Sprott, of Pilton, won the 1st and Champion Prizes in the Competition, also first place in the Southern Downs Division

Plate 50.—Mr. J. Pauli's Crop of "Clarendon," at Back Plains, Clifton, was First in the Eastern Downs Division

The Director of Agriculture, Mr. H. C. Quodling, is the figure in the foreground

"Of the world's great work he has done his share
Who has garnered a crop of wheat."

PLATE 51.—MR. E. C. KREIG'S EXCELLENT CROP OF THE "DUKE OF YORK" VARIETY, AT BROOKSTEAD, WAS AWARDED SECOND PLACE IN THE EASTERN DOWNS DIVISION.

PLATE 52.—THIS CROP OF "WATCHMAN," GROWN BY MR. R. S. YOUNG ON HIS FARM AT UPPER FREESTONE, WAS AWARDED SECOND PLACE IN THE SOUTHERN DOWNS DIVISION.

"A field of gold, shadowed by green wooded hills."

Plate 53.—Messrs. J. H. and R. M. Anderson's crop of "Pusa," at Southbrook, Darling Downs, gained Third Place in the Eastern Downs Division.

". . . After all the toil and heat,
He's paid in more than silver who has grown one field of wheat."

Plate 54.—Mr. F. J. Armstrong's Crop of "Pusa," on his Farm at Pilton. was given Third Prize for the Southern Downs Division.

"Green and amber and gold it grows
When the sun sinks late in the West."

## WHEAT CROP COMPETITION, 1928—SOUTHERN DOWNS DIVISION.
## EASTERN DOWNS HORTICULTURAL AND AGRICULTURAL ASSOCIATION, WARWICK.

| Name of Competitor. | Variety. | Apparent Yield. | Points Awarded. | | | | | | | Place in Competition. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apparent Yield. | Trueness to Type and Purity. | Freedom from Disease. | Evenness of Crop. | Condition. | Cleanliness. | Total Points Awarded. | |
| | | Bus. | Half point per Bus. | Max. 20. | Max. 30. | Max. 20. | Max. 10. | Max. 20. | | |
| W. Sprott, Pilton | Pusa | 46 | 23 | 17·0 | 27·5 | 17·5 | 9·0 | 18·0 | 112·0 | 1 |
| R. S. Young, Upper Freestone | Watchman | 38 | 19 | 19·0 | 28·0 | 18·0 | 7·0 | 17·0 | 108·0 | 2 |
| F. J. Armstrong, Pilton | Pusa | 42 | 21 | 17·0 | 28·0 | 16·0 | 8·0 | 17·0 | 107·0 | 3 |
| C. W. Free, Headington Hill, Clifton | Pusa | 40 | 20 | 17·0 | 28·0 | 17·0 | 8·0 | 16·0 | 106·0 | 4 |
| Robt. Reed, Willowvale, Warwick | Novo | 40 | 20 | 17·5 | 27·5 | 17·0 | 7·0 | 16·5 | 105·5 | 5 |
| Christensen Bros., Freestone | Three Seas | 40 | 20 | 16·0 | 28·0 | 17·5 | 8·0 | 15·0 | 104·5 | 6 |
| M. S. Kelly, Junabee | Florence | 36 | 18 | 14·0 | 29·0 | 17·0 | 8·0 | 16·5 | 102·5 | 7 |
| C. W. Free, Headington Hill, Clifton | Clarendon | 34 | 17 | 17·0 | 28·5 | 16·0 | 7·5 | 16·0 | 102·0 | 8 |
| W. P. Canning, Yangan | Waratah | 36 | 18 | 17·0 | 26·0 | 17·0 | 7·5 | 16·0 | 101·5 | 9 |
| W. Crichton, Mount Juliet, Warwick | Gluyas | 38 | 19 | 16·0 | 27·5 | 15·5 | 7·5 | 15·0 | 100·5 | 10 |
| W. Tucker, Willowvale | Clarendon | 40 | 20 | 14·5 | 27·0 | 16·0 | 7·0 | 14·0 | 98·5 | 11 |
| C. Nielsen, Yangan | Novo | 36 | 18 | 14·0 | 25·5 | 17·0 | 5·0 | 12·0 | 91·5 | 12 |

WHEAT CROP COMPETITION, 1928—EASTERN DOWNS DIVISION.
ROYAL AGRICULTURAL SOCIETY, TOOWOOMBA.

| Name of Competitor. | Variety. | Apparent Yield. | Points Awarded. | | | | | | | Place in Competition. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Apparent Yield. | Trueness to Type and Purity. | Freedom from Disease | Evenness of Crop. | Condition. | Cleanliness. | Total Points Awarded. | |
| | | Bus. | Half point per Bus. | Max. 20. | Max. 30. | Max. 20. | Max. 10. | Max. 20. | | |
| J. Pauli, Clifton .. .. .. .. | Clarendon .. .. | 36 | 18·0 | 16·5 | 29·0 | 19·0 | 8·5 | 19·0 | 110·0 | 1 |
| E. C. Kreig, Brookstead .. .. .. | Duke of York .. | 34 | 17·0 | 20·0 | 29·0 | 17·0 | 8·0 | 18·0 | 109·0 | 2 |
| J. H. and R. M. Anderson, Southbrook .. | Pusa .. .. | 38 | 19·0 | 17·0 | 27·0 | 18·0 | 8·0 | 18 0 | 107·0 | 3 |
| J. Ritson and Sons, Clifton .. .. .. | Pusa .. .. | 39 | 19·5 | 16·5 | 28·0 | 17·0 | 7·0 | 17·0 | 105·0 | 4 |
| W. McLellan, junr., Nobby .. .. .. | Warren .. .. | 36 | 18·0 | 15·5 | 26·0 | 17·0 | 8·0 | 18·0 | 102·5 | 5 |
| J. W. Joppich, North Branch, Pittsworth .. | Currawa .. .. | 33 | 16·5 | 15·5 | 26·0 | 18·0 | 7·0 | 18·0 | 101·0 | 6 |
| J. Ritson and Sons, Clifton (2) .. .. | Florence .. .. | 32 | 16·0 | 17·0 | 26·0 | 17·0 | 7·5 | 17·0 | 100·5 | 7 |
| Ziesemer Bros., Bongeen .. .. .. | Florence .. .. | 25 | 12·5 | 17·0 | 27·0 | 17·5 | 7·0 | 19·0 | 100·0 | 8 |
| J. Ritson and Sons, Clifton (1) .. .. | Florence .. .. | 32 | 16·0 | 16·0 | 28·0 | 16·0 | 8·0 | 17·5 | 100·0 | 8 |
| Ziesemer Bros., Bongeen .. .. .. | Pusa .. .. | 30 | 15·0 | 18·0 | 22·0 | 17·5 | 7·5 | 19·0 | 99·0 | 9 |
| J. Flegler, junr., Irongate, Pittsworth .. | Florence .. .. | 22 | 11·0 | 17·5 | 28·0 | 17·0 | 7·0 | 18·0 | 98·5 | 10 |
| A. F. Gilkeson, Kingsthorpe .. .. .. | Clarendon .. .. | 27 | 13·5 | 16·5 | 27·5 | 16·0 | 7·0 | 18·0 | 98·5 | 10 |
| G. J. Will, Kinkora, Pittsworth .. .. | Clarendon .. .. | 27 | 13·5 | 15·0 | 27·5 | 15·5 | 7·5 | 17·5 | 96·5 | 11 |
| G. J. Will, Kinkora, Pittsworth .. .. | Currawa .. .. | 30 | 15·0 | 14·5 | 26·0 | 15·5 | 6·5 | 18·0 | 95·5 | 12 |

PLATE 55.—MR ROBERT REED'S FIELD OF "NOVO" WHEAT ON HIS FARM AT WILLOWVALE, DARLING DOWNS.

"Realisin' he was wealthy in what makes a life worth while."

PLATE 56.—A FINE CROP OF "THREE SEAS" WHEAT ON MESSRS. CHRISTENSEN BROS. FARM, FREESTONE, DARLING DOWNS.

"When the settin' sun is gettin' low above the western hills,
When the creepin' shadows deepen, and a peace the whole world fills."

Plate 57.—"Waratah" Wheat on Mr. W. P. Canning's Farm, Yangan, Darling Downs.

"Wheat, Wheat, Wheat! When it comes my turn to meet
Death the Reaper, an' the Keeper of the Judgment Book I greet,
Then I'll face 'em sort o' calmer with the solace of the farmer
That he's fed a million brothers with his Wheat, Wheat, Wheat."

Plate 58.—Mr. J. Joppich's Fine Crop of "Currawa," on Roseneath Farm, North Branch, Pittsworth, Darling Downs.

"Mountain or river or shining star,
There's never a sight can beat—
Away to the skyline stretching far—
A sea of the ripening wheat."

## WHEAT CROP COMPETITION, 1928.

SHOWING POSITION IN ORDER OF MERIT OF COMPETITORS FROM WARWICK AND TOOWOOMBA DISTRICTS.

| Name of Competitor. | Variety. | District Competition. | Apparent Yield. | Apparent Yield. | Trueness to Type and Purity. | Freedom from Disease. | Evenness of Crop. | Condition. | Cleanliness. | Total Points Awarded. | Place in Competition. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bus. | Half-point per Bus. | 20 | 30 | 20 | 10 | 20 | | |
| W. Sprott, Pilton .. .. .. | Pusa .. | Warwick .. | 46 | 23·0 | 17·0 | 27·5 | 17·5 | 9·0 | 18·0 | 112·0 | *1 |
| J. Pauli, Clifton .. .. .. | Clarendon .. | Toowoomba | 36 | 18·0 | 16·5 | 29·0 | 19·0 | 8·5 | 19·0 | 110·0 | 2 |
| E. C. Kreig, Brookstead .. .. | Duke of York | Toowoomba.. | 34 | 17·0 | 20·0 | 29·0 | 17·0 | 8·0 | 18·0 | 109·0 | 3 |
| R. S. Young, Upper Freestone .. | Watchman .. | Warwick .. | 38 | 19·0 | 19·0 | 28·0 | 18·0 | 7·0 | 17·0 | 108·0 | 4 |
| J. H. and R. M. Anderson, Southbrook | Pusa .. | Toowoomba.. | 38 | 19·0 | 17·0 | 27·0 | 18·0 | 8·0 | 18·0 | 107·0 | 5 |
| F. J. Armstrong, Pilton .. .. | Pusa .. | Warwick .. | 42 | 21·0 | 17·0 | 28·0 | 16·0 | 8·0 | 17·0 | 107·0 | 5 |
| C. W. Free, Headington Hill, Clifton | Pusa .. | Warwick .. | 40 | 20·0 | 17·0 | 28·0 | 17·0 | 8·0 | 16·0 | 106·0 | 6 |
| Robt. Reed, Willowvale, Warwick | Novo .. | Warwick .. | 40 | 20·0 | 17·5 | 27·5 | 17·0 | 7·0 | 16·5 | 105·5 | 7 |
| J. Ritson and Sons, Clifton .. | Pusa .. | Toowoomba.. | 39 | 19·5 | 16·5 | 28·0 | 17·0 | 7·0 | 17·0 | 105·0 | 8 |
| Christensen Bros., Freestone .. | Three Seas .. | Warwick .. | 40 | 20·0 | 16·0 | 28·0 | 17·5 | 8·0 | 15·0 | 104·5 | 9 |
| M. E. Kelly, Junabee .. .. | Florence .. | Warwick .. | 36 | 18·0 | 14·0 | 29·0 | 17·0 | 8·0 | 16·5 | 102·5 | 10 |
| W. McLellan, junr., Nobby .. | Warren .. | Toowoomba.. | 36 | 18·0 | 15·5 | 26·0 | 17·0 | 8·0 | 18·0 | 102·5 | 10 |
| C. W. Free, Headington Hill, Clifton | Clarendon .. | Warwick .. | 34 | 17·0 | 17·0 | 28·5 | 16·0 | 7·5 | 16·0 | 102·0 | 11 |
| W. P. Canning, Yangan .. .. | Waratah .. | Warwick .. | 36 | 18·0 | 17·0 | 26·0 | 17·0 | 7·5 | 16·0 | 101·5 | 12 |
| J. W. Joppich, North Branch, Pittsworth | Currawa .. | Toowoomba.. | 33 | 16·5 | 15·5 | 26·0 | 18·0 | 7·0 | 18·0 | 101·0 | 13 |
| W. Crichton, Mount Juliet, Warwick | Gluyas .. | Warwick .. | 38 | 19·0 | 16·0 | 27·5 | 15·5 | 7·5 | 15·0 | 100·5 | 14 |
| J. Ritson and Sons, Clifton (2) .. | Florence .. | Toowoomba.. | 32 | 16·0 | 17·0 | 26·0 | 17·0 | 7·5 | 17·0 | 100·5 | 14 |
| Ziesemer Bros., Bongeen .. .. | Florence .. | Toowoomba.. | 25 | 12·5 | 17·0 | 27·0 | 17·5 | 7·0 | 19·0 | 100·0 | 15 |
| J. Ritson and Sons, Clifton (1) .. | Florence .. | Toowoomba.. | 32 | 16·0 | 16·0 | 28·0 | 16·0 | 8·0 | 17·5 | 100·0 | 15 |
| Ziesemer Bros., Bongeen .. .. | Pusa .. | Toowoomba.. | 30 | 15·0 | 18·0 | 22·0 | 17·5 | 7·5 | 19·0 | 99·0 | 16 |
| J. Flegler, junr., Irongate, Pittsworth | Florence .. | Toowoomba.. | 22 | 11·0 | 17·5 | 28·0 | 17·0 | 7·0 | 18·0 | 98·5 | 17 |
| W. Tucker, Willowvale .. .. | Clarendon .. | Warwick .. | 40 | 20·0 | 14·5 | 27·0 | 16·0 | 7·0 | 14·0 | 98·5 | 17 |
| A. F. Gilkeson, Kingsthorpe .. | Clarendon .. | Toowoomba.. | 27 | 13·5 | 16·5 | 27·5 | 16·0 | 7·0 | 18·0 | 98·5 | 17 |
| G. J. Will, Kinkora, Pittsworth .. | Clarendon .. | Toowoomba | 27 | 13·5 | 15·0 | 27·5 | 15·5 | 7·5 | 17·5 | 96·5 | 18 |
| G. J. Will, Kinkora, Pittsworth .. | Currawa .. | Toowoomba.. | 30 | 15·0 | 14·5 | 26·0 | 15·5 | 6·5 | 18·0 | 95·5 | 19 |
| C. Nielsen, Yangan .. .. .. | Novo .. | Warwick .. | 36 | 18·0 | 14·0 | 25·5 | 17·0 | 5·0 | 12·0 | 91·5 | 20 |

* First and Champion.

Plate 59.—Messrs. Ziesemer Bros. field of "Florence," at Bongeen Darling Downs.

"And the breeze sweeps o'er the rippling rows,
Where the quail and skylark nest."

Plate 60.—Mr. G. J. Will's fine crop of "Currawa" Wheat at Kinkora, Darling Downs.

". . . . with a feelin' like content,
An' I feel like thankin' Heaven for a day in labour spent."

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING DECEMBER, 1928 AND 1927, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Dec. | No. of Years' Records. | Dec., 1928. | Dec., 1927. | | Dec. | No. of Years' Records. | Dec., 1928. | Dec., 1927. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | In. | | In. | In. |
| Atherton ... ... | 7·77 | 27 | 6·50 | 7·76 | | | | | |
| Cairns ... ... | 8·79 | 46 | 3·75 | 3 38 | Nambour ... ... | 6 92 | 32 | 5·04 | 11·82 |
| Cardwell ... ... | 8·35 | 56 | 3·83 | 11·16 | Nanango ... ... | 3 84 | 46 | 4·90 | 4·49 |
| Cooktown ... ... | 6 96 | 52 | 2·07 | 6·68 | Rockhampton ... | 4 82 | 41 | 4·36 | 9·14 |
| Herberton ... ... | 5·70 | 41 | 6·58 | 4·94 | Woodford ... ... | 5 76 | 41 | 2·79 | 10·46 |
| Ingham ... ... | 6·94 | 35 | 8·78 | 6·00 | | | | | |
| Innisfail ... ... | 11·87 | 47 | 10·34 | 14·58 | | | | | |
| Mossman ... ... | 11·97 | 15 | 4·29 | 9·40 | | | | | |
| Townsville ... ... | 5·61 | 57 | 3·76 | 8·50 | *Darling Downs.* | | | | |
| | | | | | Dalby ... ... | 3·22 | 58 | 3·09 | 2·94 |
| | | | | | Emu Vale... ... | 3·54 | 32 | 5·24 | 3·60 |
| *Central Coast.* | | | | | Jimbour ... ... | 3·20 | 40 | 4·28 | 3·65 |
| Ayr ... ... ... | 3·97 | 41 | 4·13 | 9·63 | Miles ... ... | 2 97 | 43 | 2·28 | 5·09 |
| Bowen ... ... | 4 51 | 57 | 2·10 | 8·86 | Stanthorpe ... | 3·52 | 55 | 4·94 | 2·71 |
| Charters Towers .. | 3·54 | 46 | 3·82 | 3·94 | Toowoomba ... | 4·35 | 56 | 5·91 | 5 92 |
| Mackay ... ... | 7·35 | 57 | 10·10 | 35·82 | Warwick ... ... | 3·45 | 63 | 2·74 | 2·62 |
| Proserpine ... ... | 8·31 | 25 | 10·10 | 11·75 | | | | | |
| St. Lawrence ... | 4·73 | 57 | 7·80 | 15·51 | | | | | |
| | | | | | *Maranoa.* | | | | |
| | | | | | Roma ... ... | 2·51 | 54 | 1·53 | 3·45 |
| *South Coast.* | | | | | | | | | |
| Biggenden ... ... | 4·80 | 29 | 2 81 | 3 95 | | | | | |
| Bundaberg ... ... | 5·04 | 45 | 1·19 | 6·84 | | | | | |
| Brisbane ... ... | 4 94 | 77 | 2·56 | 5·58 | *State Farms, &c.* | | | | |
| Caboolture ... ... | 5·27 | 41 | 3·88 | 7·19 | Bungeworgorai ... | 3·05 | 14 | 0 | 3·41 |
| Childers ... ... | 5·82 | 33 | 4·29 | 4·39 | Gatton College ... | 3·64 | 29 | 0 | 7·28 |
| Crohamhurst ... | 7·20 | 35 | 4·24 | 13·51 | Gindie ... ... | 3·04 | 29 | 2·58 | 7·41 |
| Esk ... ... ... | 4·58 | 41 | 9·64 | 7·96 | Hermitage ... | 3·03 | 22 | 0 | 3·41 |
| Gayndah ... ... | 4·18 | 57 | 3 28 | 6·42 | Kairi ... ... | 6·93 | 14 | 3·29 | 3·57 |
| Gympie ... ... | 6·14 | 58 | 4·01 | 9·17 | Sugar Experiment Station, Mackay | 8·93 | 31 | 8·65 | 36 59 |
| Kilkivan ... ... | 4 63 | 49 | 2·71 | 6·57 | Warren ... ... | 3·84 | 14 | 0 | 6·18 |
| Maryborough ... | 4·76 | 56 | 5·10 | 3·84 | | | | | |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December this year, and for the same period of 1927, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

## SEED POTATOES.

The careful selection of a suitable class of seed potatoes is necessary where potatoes are grown commercially. The utilisation of an even type of seed as regards sprouting size and shape means a regular and even germination, and as like begets like it is to be expected (all conditions being favourable) that the resultant crop will also be even in character. Seed should be selected carefully. Whole seed of two ounces size is to be at all times preferred. Tubers should be free of all signs of disease, regular in shape and size, and should be well sprouted or "shot" before the planting period eventuates. In this connection sprouts should be hardened by exposure to light and should not exceed ½ of an inch in length. Sprouts in excess of this length are apt to be damaged in handling during the process of planting.

Where disease such as scale is suspected the usual formalin treatment prior to planting is to be recommended, using 1 pint of 40 per cent. formalin to 20 gallons of water and immersing therein tubers and bags for 1½ hours. Allow the tubers to dry under shade before planting. A slight discoloration of the sprouts if very tender may take place as the result of their coming in contact with the formalin solution, but the setback so obtained will be more than counterbalanced by the subsequent clean growth of the resultant plants.—A. E. GIBSON, Senior Instructor in Agriculture.

# FARM TRACTORS.

## PLACE OF THE VALVES IN THE CYCLE OF OPERATIONS.

By E. T. BROWN.*

As suggested in a previous article the timing of the valves is decided by the maker of the engine. He is guided by various factors, such as the size of the valve opening, the compression ratio of the engine, its horse-power, and the engine speed. It is, however, better that the tractor operator should understand exactly when the valves are caused to open and shut, so that after dismantling he may be in a position to retime the engine if necessary. Here it might be remarked that whenever the engine is taken down the timing wheels working from the engine crankshaft should be marked so that they may be returned in exactly the same position. It is not commonly realised, but a tractor engine is a very wasteful machine. Not more than about one-fifth of the energy stored in the fuel is available for actual work. It is, however, one of the least wasteful of all the prime movers. In tractor engine construction it is essential to make a number of compromises. For instance, heat implies power, but it is necessary to sacrifice a certain amount of heat—dissipated by means of the cooling water—owing to the fact that the metal employed for cylinder construction is a conductor of heat. Failing cooling, the pistons would "seize" in the cylinders owing to excessive expansion. A second case in point is valve timing. It is found necessary to make serious sacrifices to secure the most possible power.

### Timing the Inlet Valve.

When discussing the cycle of operations of a tractor engine it is usual to say that the inlet valve opens when the piston is at the top of its compression stroke and that it closes at the bottom of the inlet stroke. This is almost correct in the case of a very low-speed engine; it is not practicable with a comparatively high-speed engine like that used for a tractor. The mixture of air and fuel vapour is carried from the carburettor to the combustion chamber by the induction pipe. The fuel vapour is only held in very unwilling suspension. If the induction pipe be too large, which implies a slower movement of the mixture, the fuel vapour tends to liquefy. It is only possible to have valves of a certain size, the size being governed by the cylinder bore. The normal speed of a tractor engine is about 1,000 revolutions a minute. With the largest induction pipe and valve in use it is impossible for the mixture to enter the combustion chamber as rapidly as the piston descends on its induction stroke. This means that if the inlet valve were to open exactly at "top dead centre" and close at "bottom dead centre" only a partial charge would enter. The power of the firing stroke depends upon the quantity of firing mixture in the chamber. To give the incoming charge an opportunity of entering the combustion chamber it is necessary to keep the inlet valve open for some time after the piston has passed "bottom dead centre." In the majority of tractor engines the inlet valve is timed to close about 30 degrees late—that is, when the piston has travelled one-sixth of its compression stroke. Even so, the combustion chamber is not completely charged, but it contains more mixture than if the inlet valve had closed at "bottom dead centre." Incidentally it may be mentioned that this valve does not open until about 10 degrees after "top dead centre" has been reached. The reason for this is explained later.

### The Exhaust Valve.

Exactly the same state of affairs is found with the exhaust valve. The piston rises on its exhaust stroke at such a high speed that it is impossible for it to drive out the exhaust gases. These would be compressed to such an extent were the exhaust valve only to open at "bottom dead centre" that the speed of the engine would be materially reduced and efficiency would be lost. When the piston is three-quarters of the way through its firing stroke the contents of the combustion chamber registers a pressure of between 40 lb. and 50 lb. to the square inch. If the exhaust valve be opened at this time the pressure assists the expulsion of the inert gases, while more time is also allowed. Hence there is not the same degree of back pressure on the piston head. The exhaust valve, too, is closed from 5 degrees to 10 degrees past top dead centre, so that the combustion chamber may be entirely emptied of its contents. This is the reason for the late opening of the inlet valve. The latter opens at the moment the exhaust valve closes.

### Timing the Valves.

When retiming the engine the marks on the flywheel should be noted. These marks show the exact position of the piston in No. 1 cylinder—that is, the cylinder nearest the radiator. All that is necessary is to see that the flywheel is in the correct position for the opening of the inlet valve when the camshaft should be rotated until the inlet valve in this cylinder is just on the point of being raised. If the exhaust

* In the "Farmer and Settler."

cams be on a separate camshaft the flywheel should be put in that position, which denotes the opening point of the exhaust valve when the camshaft may be set correctly.

### Careful Attention to Minor Details.

Unless the sparking plugs be kept in good order it is immaterial whether the magneto be working efficiently and the wiring be all that is desirable; it is impossible to secure a good "fat" spark to explode or fire the mixture of air and fuel vapour. The plugs must be kept clean and the gap between the points must be correctly set. The lubricating oil, which works up from the base into the combustion chamber, tends to coat the points of the plugs with carbon, and in course of time the deposit becomes so great that the gap is completely bridged. This means that the current, instead of forming a spark, simply passes over the carbon bridge without exploding the mixture. From time to time the plugs should be taken out and the carbon deposit removed. If the plugs be of the detachable type—that is, can be taken to pieces—this is a simple enough task. If they be made in one piece, the points may be scraped with a blunt knife, or if they be very dirty they may be boiled in a strong soda solution. Another method of cleaning is to turn the plug upside down, fill the body with petrol, and set fire to it. This burns the deposit away rapidly. When the plugs have been cleaned the extent of the gap should be tested by means of a feeler gauge, which is usually supplied with the machine. The best results are obtained by having a gap of one thirty-second of an inch, but this varies a little with different makes.

### Cracked Cylinder Jacket.

If the supply of cooling water be inadequate or the cooling system be dirty there is always a chance that the jackets surrounding the cylinders may become cracked. If the crack be a large one the only thing is to buy a new cylinder block in place of the damaged one. But, as a general rule, the crack is only a small one, in which case it is a simple matter to effect a repair. There are two ways in which a cracked water jacket can be successfully mended. When the crack is less than a thirty-second of an inch in width the "rust joint" method can be employed. To effect a repair the water should be drained from the system and the drain cock closed. A piece of putty or tallow is then placed over the crack, care being taken not to allow any to enter. The cooling system is then filled with a solution of salammoniac to a level slightly above the top of the crack. This is allowed to remain in for half an hour. At the end of this period the system is drained and the engine run for a few minutes to warm the jacket. The process must be repeated three or four times. This forms a "rust joint," which will last for many years. The strength of the solution should be 1 lb. of salammoniac to 1 gallon of water.

### The Steel Cement Method.

If the crack be too wide to repair by the above method, it can be filled with steel cement. The paint should be scraped off to a distance of ½ inch all round the crack, and the edges bevelled off about ⅛ inch. Very great care must be exercised in doing this part of the job, as it is an easy matter to break the casing completely. A sharp chisel should be used for the purpose. The cement mixture is then forced into the crack—a putty knife serves the purpose admirably—until the crack is filled, when the cement should be smoothed and rounded off. It should then be allowed to harden for two or three days. The cement takes on the properties of the surrounding metal and a perfect joint is formed.

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## QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

Probably because of its strikingly ornamental timber the Tulipwood is one of the most widely known of Australian rain-forest trees. Its alternating bands of dark and pale wood evidently attracted the attention of settlers in the early days of colonisation as the timber and its qualities have been known for a long time. The species is termed *Harpullia pendula* by botanists. The trees attain a height of about 80 feet and a stem diameter of about 2 feet. The stem is sometimes flanged at the base in large trees; it is often irregular and grooved or angular in cross section. The bark is grey and is shed in round or irregular long flakes. The trees usually have a very large amount of pale or yellowish sapwood which is strongly contrasted with the dark-brown heartwood. The wood is very heavy and finely grained. The trees are frequently seen in cultivation in Brisbane streets. In nature the species is found as far south as the Bellinger River, in New South Wales (J. H. Maiden), and up as far as the Mulgrave River in North Queensland. The wood is used for parts of the external framing of billiard tables, for walking-sticks, and small wooden articles in which its brilliant colour contrasts become effective. The accompanying photographs illustrate the species as it is represented in the field and herbarium.

*Photo.: W. D. Francis.*]

PLATE 61.—TULIPWOOD (*Harpullia pendula*).

A tree growing among granite boulders in the Kin Kin rain forest.

*Photo.: Dept. of Agriculture and Stock.*]

PLATE 62.—TULIPWOOD (*Harpullia pendula*). (A) DRY FRUIT.

# FRUITGROWING IN QUEENSLAND.

## FIELD REPORT.

*The following report on the prospects of the fruit industry in the North Coast district has been received by the Minister for Agriculture and Stock (Hon. W. Forgan Smith) from Mr. R. L. Prest, of the Fruit Branch:—*

### MAROOCHY.

Bananas will generally be light and not of the best quality, especially those grown on the poorer forest country, having suffered severely during the past dry periods.

Pines.—A good crop is to be expected and plants will have benefited by the present rains. It is expected that the size will be generally smaller, perhaps an advantage in the case of those produced on the heavier soils of the Blackall Range, which as a rule are on the large side.

Citrus.—Will generally be light but, where the trees are receiving attention and feeding, of fair quality. It is unfortunate that soil, climatic, and cultural methods are not all that could be desired in this district, which generally accounts for the low condition of citrus orchards and the quality of fruit.

### GAYNDAH.

Citrus.—Crop is generally medium to light, but promises to be of excellent quality, citrus production at present being in its infancy. The alluvial flats on the banks of the Burnett are well situated for irrigation, and climatic conditions are favourable for the production of high-grade Beauty of Glen Retreat mandarins, lemons, and navels. About 50 acres of new orchards have been planted during the past twelve months. This district can be recommended for citrus growing, provided care is taken to select the right class of soil and varieties for planting. Suitable water is available for irrigation.

### ROCKHAMPTON, BONDOOLA, AND YEPPOON.

Bananas.—Generally a medium to good crop of good quality fruit from the richer soils.

Pines.—A moderate to good crop where grown on suitable soils.

Citrus.—Generally light and of moderate quality, too many orchards being on uncongenial soil with climatic and cultural conditions not favourable for the production of first-grade fruits.

### BYFIELD.

Bananas.—Will generally be good to very good, though a less tonnage may be expected than that of last year, which for the first six months of the year was approximately 360 tons of bananas, and over 200 tons of citrus fruits. The bananas harvested were from less than 200 acres of plantations. This slight falling-off of production may generally be put down to the past dry condition which prevailed in this district, and to the increase in the damage done by banana beetle borer.

Citrus.—Generally light, but of fair quality considering the humidity under which they are grown. Citrus orchards have not received the attention needed for good orcharding, except in perhaps one case which is worthy of mention, Mr. C. H. Richter's orchard of 300 seedling mandarin and orange trees producing approximately 4,000 cases of marketable fruit, an example of the value of care and attention to the citrus orchard. The future prospects of this district appear good. There is one drawback to the district, that is the haulage of their produce over 28 miles of bad roads to the railhead at Yeppoon.

*A HELPFUL AND INTERESTING JOURNAL.*

*A Nimbin (New South Wales) subscriber writes:—*

*"I must congratulate you on publishing such a splendid work. It is chock full of valuable and useful information, and it provides helpful and interesting reading not only for the farmer himself but for the rest of the family also."*

# GRADE STANDARDS FOR BANANAS.

## MINISTERIAL STATEMENT.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) has informed the Press that for some time past he had been drawing the attention of the banana growers of Queensland to the necessity of placing their industry on a sound basis. In previous statements to the Press he had called attention to certain obvious weaknesses in organisation and methods, particularly with regard to marketing and the establishment of satisfactory grade standards. The importance of standard grading could not be stressed too much. Many industries at the present time were being injured because a few people in those industries failed to do the right thing, and because of such neglect injury was inflicted on others who conformed to the prescribed conditions and standards. It was necessary to do something further in the direction of providing that fruit of suitable quality only should be exported. The necessity for action along those lines had been accentuated in view of the complaints that had frequently reached here concerning the quality of Queensland bananas as supplied to the Southern markets. Unfortunately, investigation had shown that a proportion of the fruit so marketed justified some of those complaints. Regulations had been drafted under "*The Fruit and Vegetables Act of* 1927" for the purpose of providing grade standards for Cavendish bananas, the proposed grades being as under:—

Cased bananas shall be divided into three grades—"Choice," "Standard," or "Plain."

"Choice" shall mean sound fruit free from blemish, and having a minimum length of 8 inches and minimum circumference of 4¾ inches.

"Standard" shall mean sound fruit free from blemish, and having a minimum length of 6½ inches and minimum circumference of 4½ inches.

"Plain" shall mean sound fruit having a minimum length of 5½ inches and a minimum circumference of 4 inches.

*Note.*—All measurements for length are to be taken on the outside of the curve, from the junction of the fruit at the stem and to the apex of the fruit.

The Minister added that it was anticipated that these standards would be operative on and after the 19th January, and that it was the intention of the Department to vigorously enforce the grade requirements. The bulk of our banana-growers supplied bananas of good quality, but there were in the industry some growers who, through neglect or other causes, marketed bananas of unsatisfactory size and quality. It was necessary that these delinquents should not be allowed to destroy the banana industry of Queensland.

Mr. Forgan Smith is causing copies of the proposed grade standards for bananas to be sent to the Ministers of Agriculture in other States, and is suggesting, in cases where standards for bananas have not been established, that grade standards similar to those to operate in Queensland shall be provided. The Minister is aware, because of seasonal conditions, and owing to much suitable banana-growing country going out of production because of the invasion of the "Bunchy Top" disease, that there has been some difficulty in raising fruit of satisfactory quality; but, on the other hand, there is evidence that some growers have attempted to grow bananas on land that is unsuitable for the purpose, while there are other growers who have failed to give the banana plant the necessary cultural attention. Others, again, have cut the bananas at too early a stage and before the fruit has filled and developed sufficiently to enable it to mature properly. These, however, are factors that cannot be allowed to prejudice the industry, and possibly lead to the present protection against black-grown bananas being removed.

A very rigid inspection will be made at leading stations and other points in transit, and inspectors have been instructed to enforce the regulations in all cases where such action is found necessary.

It, therefore, behoves all growers to grade, market, and present their fruit in accordance with the requirements of the Act and Regulations, as otherwise action will be taken against them. The Minister looks to the banana-growers of the State generally to give their cordial support and assistance to the Department in its efforts in this direction. By those means the industry could be placed on an unassailable foundation, and much better returns accrue to the growers.

# SHEEP AND WOOL.

By W. A. RUSSELL, M.L.A.*

*No better service can be rendered to a valuable industry in a State like Queensland than that men familiar with the workings of the industry should seek to enlist for it the enlightened interest of their fellow citizens. This is what Mr. Russell is doing, and the subjoined notes from an address by him will be read with appreciation by those who realise the place that wool—one of our greatest assets—occupies in our economy.*

ON a subject such as this only a sketchy outline can be given in the course of a short address. Confining my remarks to Queensland will narrow somewhat the scope of my observations.

## Historical Sketch.

The first sheep were introduced to Queensland by the late Robert Martin Collins, of Mundulan, Beaudesert. This was in the latter end of 1842. The sheep were merinos, and as such, had eventually to be transferred to the Downs and Western Queensland. It is generally recognised that coastal areas are not suitable for merinos. By the turn of the wheel in the history of the State, Mundulan now carries sheep again. A first class Romney Marsh stud has been established there, and at recent sales top price for the series was realised for Mundulan wool. The Darling Downs has carried sheep since 1843, when Patrick Leslie and Frederick Bracker stocked land around Warwick with sheep. By 1861, from the few thousands introduced in the 40's, the numbers had grown to over 4,000,000 by importations from the South, and their natural increase. From there, sheep were distributed all over the State.

At first, and for many years afterwards, the short-stapled Saxony wools only were grown, and flocks were strengthened by constant importations of rams from Germany, Steiger and Gadegast blood being the chief types used. The sheep of those days cut an average of less than 4 lb. of greasy wool, spinning not less than 80's count, which is superfine. You will probably often see, in the daily Press, statements such as 64's tops are quoted at 50d., &c. It would be well to explain what "counts" means. It is based on the number of hanks of yarn of 560 yards length spun from a pound of clean wool. As an illustration, a 60's count means 60 multiplied by 560 (yards) equals 33,600 yards of yarn in a sixty top. This by the way.

The Saxony and Silesian wools have a black tip, and they contained what would be considered to-day excessive yolk and fat, the scoured yield seldom going above 45 per cent. of clean wool. They were light-boned, narrow, low-set animals, their fine wool denoting fine or delicate constitutions. This type has now disappeared from Queensland, and it may be interesting to show why the short fine wools on comparatively small sheep have been replaced by the long, medium to fine wools grown on a big body with a strong constitution. It is true that a limited quantity of short superfine wool is still shorn in Queensland, but it comes from old ewes, that when young grew fine combing wool, and which had, through age, lost its length and strength of fibre.

## The Wanganella Strain.

The improvement in weight of fleece is double now—7 lb. per head on an average, and was brought about by the introduction of the Wanganella type. The Wanganella type, called abroad the "Australian Merino," was founded by Messrs. Peppin Brothers, in 1859, when 100 ewes of nearly pure Rambouillet blood were brought from Victoria to Wanganella, in the Riverina. By the greatest of good fortune, a pure bred Rambouillet ram, called "Emperor," had been brought to Sydney. This ram was acquired by the Peppin Brothers, and he "nicked" wonderfully well with the ewes on Wanganella. From him are descended most of the splendid sheep in New South Wales and Queensland. A further addition to the flock was made when two pure Rambouillets were imported from America. These were sons of "Old Grimes," a son of "Golden Drop"—a ram for which its owners, Messrs. Hammond Brothers, of New York State, refused 25,000 dollars, or about

*In an address delivered before the Kurilpa Progress Association.

£5,000. These two rams also "nicked" splendidly with the progeny of "Emperor." There has been no outcross (fresh blood) introduced into the flock for nearly sixty years. The Rambouillets are French merinos bred from Spanish sheep stolen by Napoleon Bonaparte during the conquest of Spain. This Wanganella type, as I have said, is the Australian merino as distinguished from the Saxony types represented by the Tasmanian, Mudgee, and Western Victorian types. A stud has been formed in Queensland at Victoria Downs, Morven, and at the annual sheep sales may be seen splendid examples of the Wanganellas. They are big plain-bodied sheep, carrying a fleece weighing on an average over 24 lb. of greasy wool. Note the remarkable difference between the sheep of 100 years ago—the fleeces of which averaged 2½ lb. of wool—and those of the present day.

A good flock of merino sheep, ewes, and wethers will average to-day over 10 lb. of wool (greasy). The quality is medium, that is, from 64's to 66's count. Approximately the wools of Queensland are classed as "strong," "medium," and "fine." Strong means 60's to 64's count, medium 64's to 70's count, and fine 70's to 80's count; 80's and upwards is superfine, and there is little of it in this State. What the development of the merino has meant to Australia is in itself an absorbing story. It is sufficient for the moment to say that 60 per cent. of our exports are, in values, represented by the merino sheep's wool, sheepskins, &c., and, incidentally, 34½ per cent. of the income tax assessed in Queensland is paid by woolgrowers.

### The Fat Lamb Trade.

There is another aspect of the sheep and wool industry in Queensland, and that is the establishment of a fat mutton and fat lamb export business. Generally speaking, pure merinos are not favoured abroad as mutton carcases.

In most countries, and in some States of the Commonwealth where farming predominates over the pastoral business, sheep are looked upon as a tool of the farm. Sheep are scavengers in agriculture—that is, they eat anything in the vegetable family—even weeds. They are, besides, profitable not only for their wool, but for their flesh. They are easily handled, requiring far less attention than any of the other domesticated animals. The welfare of the sheep farmers of New Zealand is dependent upon their fat lamb and fat mutton export trade. Merinos are not used there excepting as one component of the crossbreds. Queensland is essentially a merino State, only 4 per cent. of her flocks being of British breeds or their crosses, yet our fat lambs can be, and have been bred quite as good as any New Zealand sheep. The precarious rainfall west of the Dividing Range, however, precludes the establishment of a fat lamb or fat mutton trade as a permanent business on a large scale. On the coastal areas there are much better conditions for sheep, for the rainfall is, at least, quite as good as that of New Zealand, with the added advantage of no winter as that season is known there.

In regard to the fleeces shorn from crossbreds, the price per lb. is at least 30 per cent. lower than for merinos, but the mutton and lamb more than make up in extra price and saleability. There is no reason why we should not build up an export trade for mutton and lamb here.

### Sheep on the Coast.

Lately, sheep have been depastured on coastal areas and it has been shown that every ewe will return in lamb and wool not less than 20s. per head per annum, if the right breeds are used. The time has come when increased price per acre of land must induce intenser cultivation. With more cultivation must come the keeping of sheep, even if used only as "scavengers," or effective "weed killers," and few farms will be without their small flocks. From small beginnings it is possible that a big export business may be evolved.

### Queensland the Healthiest Stock Country in the World.

The chief difficulties in the way of profitably keeping sheep may be shortly stated:—The greatest is blowfly infestation. Owing to the prevailing dry conditions in our pastoral areas, flies have not been in evidence to any great extent for two or three years. With the advent of good seasons, however, the pest is sure to become troublesome again. In my experiments on my station at Dalmally we discovered a treatment which gives 90 per cent. protection for a period of from about ten to twelve weeks. That is further than any others elsewhere have got. Dogs, and drought, too, take their toll of the flocks. Queensland, however, is freer of sheep diseases than any other country in the world.

### In the Wool Shed—A Tribute to Australian Workers.

Wool is shorn at a suitable time of the year, and sent to the coast to be sold at the periodical sales. To those who have never seen shearing, or wool being classed or sold, a short description of both phases of the great pastoral business may be interesting. After everything is got ready for the team of shearers who go from shed to shed, the ordinary station becomes an active scene of hard work. The harvest of the previous twelve months' work is about to be gathered. Sheep are being mustered in the paddocks, stores are laid in to provide food for the men in the shed, and on the appointed day the whistle blows for the start. The shearers dart into the pens where the "woolly" sheep are held, and picking the softest shearing animals, they carry them to the board. It is a bustling and interesting scene. The wool falls off the animal, before the machines, and presently the shorn sheep, white as snow, go down into the counting pens, and the shearer darts back for another one. To see a sheep shorn, one is reminded of the peeling of an orange. After the fleece is removed from the animal, the "picker-up" takes the fleece, and running along the board, throws it out just as if it were a small blanket. The wool rollers skirt off the different kinds of pieces and stained wool, and then, after throwing it in the sides, roll the fleece into a neat ball. The fleece then is placed in the appropriate bin. There are a number of these bins, each of which will contain a particular class of wool. Usually the classing is AAA., AA., A., Broken, 1st Pieces, 2nd Pieces, Stained Pieces, Bellies, and Locks. Sometimes, with some clips, there are clothing classes. Combing is wool that is suitable for the worsted trade. It is long enough to be fit for the combing machines. Clothing wools are used for the ordinary woollen trade. Combing causes the fibres of the wool to be laid parallel to each other, while with clothing wools, which are carded, the fibres are mixed up. Combing wools allow a much tighter spin to the yarn than clothing or carding wool. The latter are used for broadcloth, &c., and the main principle of carded wools is that after weaving they are felted by the application of moisture and heat. After the classer has placed the wool in its appropriate bin, the presser, when sufficient wool has accumulated, puts the particular quality into the boxes of the wool press. When filled, power is applied to squeeze the contained wool into about a third of its original size. The flaps are sewn on the top, and the bale is turned out. It is then branded with the name of the station or holding, its class, name, and number, and after being weighed, and its weight entered in the shed book, it is ready to be loaded on to the waiting wagon by which the clip is conveyed to the railhead for despatch to the sale centres at one or other of our sea ports. On arrival at the stores on the waterfront it is weighed and stacked away until the wool sales are due.

### The Efficiency of our Marketing Methods—Australia's High Reputation.

The Australian methods of sale are practically perfect in efficiency, and are being copied over the whole world. Prior to the fixed date of sales, samples are extracted from the clip in store, representing a number of bales of each class. They are taken haphazardly from the bulk. The sample bales are placed, with probably a thousand others, on the well-lighted wool floors, and opened up, there to await inspection and valuation by buyers, who come from every civilised country. The importance to Queensland of the business may be judged when it is known that the sum of £1,300,000 sterling was paid for the wool sold during a recent sale. After the buyers have valued the wools, they assemble at the auction room in Parbury House in Eagle street. The sale room is a huge auditorium with rows of seats and desks rising in tiers back to the gallery where interested people, other than buyers, watch the proceedings. It is in the tiers that the buyers are seated with their catalogues marked before them. The auctioneer, with his assistants, is on a dias. It is marvellous to see the speed with which hundreds of thousands of pounds worth of wool is disposed of in one short afternoon. It is wonderful, too, to observe the certainty with which the auctioneer picks out the successive buyers from the groups of shouting and frantically gesticulating bidders. It is worth while studying the whole operation from the valuing floor to the sale room. The wool is then shipped to reach manufacturers in every corner of the civilised world.

The Australian wool market is looked upon abroad as being essentially honest. That is, the wools are, with very very rare exceptions, pressed honestly at the wool sheds, and sold honestly at the sales. We have every reason to be proud of our reputation in wool matters.

## HOW TO TREAT FLYBLOWN SHEEP.

Individual sheep can often be caught and treated in the paddock, but with a serious infestation it may be necessary to yard the flock or run them into a suitable corner so that they may be examined thoroughly and none may be missed. Struck sheep may show maggots either (*a*) in wounds in the skin, or (*b*) in the wool only.

### Where the Maggots are found.

In the former, maggots are usually found in the depth of the wound, and, provided the wound is an open one, one dressing is usually fatal to all maggots, but such a wound is liable to be restruck in a few days. Sheep so affected therefore require dressing as often as they are restruck. These wounds may have been caused by injury, such as shear cuts, crow "picks," &c., and have subsequently become invaded by flies with consequent deposition of maggots, or the wounds may have followed a striking of the wool by maggots. In other cases the wound is not an open one. It is deep, or the sides are under-run, pus and maggots being to a greater or lesser extent hidden from sight. Such wounds require careful and often repeated dressing.

### Remove Struck Wool and Maggots.

If the dressing is applied merely over the wool and rubbed well in the smaller maggots are destroyed, but the larger ones may overcome the effects of the dressing and move to new grounds to carry on their parasitic existence. Also, if the wool is not removed it is sometimes difficult to gauge the area in which the maggots are working, and consequently some may be missed when rubbing in the dressing.

The affected sheep is caught and held in a convenient position while the wool around the affected area is shorn off close to the skin in such a way as to define completely the struck patch, and to leave a border of at least an inch of normal wool all the way round; all "daggy," matted, or soiled wool about the breech of the sheep should be cut away. This lessens considerably the chances of a strike on some other part of the sheep. The struck area may be traced from the discolouration of the wool by the exudate that is given out. The wool close to the struck patch generally has a moist, clammy appearance, and is lacking in the lustre of normal healthy wool.

It is now desirable to remove all maggots. This can be done by striking the area briskly with the flat side of the shears, when the majority will be shaken off. Generally a few remain on, particularly in the case of wrinkly sheep, when they burrow down into the wrinkles. If time permits every maggot should be removed, but this is not always possible, and the dressing must serve to destroy the few that are left.

### How to Apply the Dressing.

The dressing can be carried conveniently in a bottle, from which it may be poured on to the struck area, to be rubbed well in with the blades of the shears. It is necessary to rub the dressing well into the wrinkles and around the edges of the area, as the maggots move quickly and seek to hide themselves in the hollows of the wrinkles and in the unshorn wool.

After the wool has come away from a struck area a scab often forms over the raw patch, and maggots are frequently found under this scab. It is useless in such a case merely to apply the dressing over the scab, as it does not reach the maggots underneath, and they thrive as though nothing had been done to check them. It may seem to be retarding healing to remove a scab to get at the maggots, but this action is necessary.

With a badly struck sheep one dressing may be insufficient to cure the extensive wounds, hence it is necessary to continue the treatment until the wound is completely healed. The wound is liable to be restruck as long as there is moisture on the surface. It may scab over and become dry on the surface, but if the scab becomes knocked off before healing has taken place underneath a restrike may follow.

### What an Effective Dressing should Do.

To be effective, a dressing should have the following properties:—(1) It should destroy the maggots without injuring the sheep or the wool; (2) it should be soothing and healing to the wound; (3) it should adhere to the wool and the affected

area of skin; (4) it should be repellent to the fly and thus prevent restrikes for a reasonable time.

After dressing—unless it is a very severe case, when it may be penned or paddocked separately to facilitate further dressing—the sheep can be let go again amongst the flock. One dressing is sufficient in most cases for the treatment of a strike, provided, of course, that it has been detected before the effects have become severe, which can only be assured by careful and regular inspection of the flock at sufficiently close intervals. It is a good plan for the stockman to keep the dressing in a bottle tied to his saddle, so that it is available at all times.—A. and P. Notes, N.S.W. Dept. Ag.

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## THE CULT OF THE COLT.*

### FIRST RIDES—TYING-UP.

(By "U 9 L.")

We have mounted the colt once, got off him again, and then we mount and dismount several times. You see, its all educational. The only thing I would impress upon you is to mount him slowly—climb on, struggle up, get on any old way at all so long as you get on. But, above everything else, be careful. Early impressions last longest, so some wise old fellow is once reported to have said, and if in your carelessness that colt douses you, then you have made a mess of things, and it is going to take a lot of work to erase that bad impression. Also I would ask of you to do all things in a natural manner. Try and let the little fellow know by your actions that it is quite the proper thing to which you are subjecting him, and that it is a natural process to finalise the education of every cultured horse. Some breakers even go further and do the off side as well. For my part, I could never see any force in that. It 's running a risk which doesn't profit you or the colt commensurately with that risk. Nine out of ten men, myself included, are as awkward as a gin in boots when attempting the unusual. That off-side mount is never going to be used, and to do a thing which we may only effect clumsily and with infinite caution is not conducive to the colt's well being.

#### In the Saddle.

Before getting on the youngster finally it is well for us to take a persuader with us. The colt hasn't yet learned to carry a man, he doesn't know the rules of gee and whoa, and we want something which will prompt him to move. We want a thing which will frighten him without intimidating him, a thing he can feel without it hurting him, something which won't cut, will not bruise, and yet which is handy for us to use. The best thing of the lot, in my idea, is a length of garden hose—a piece about 2 feet long, or a shade longer. When you flap that on his ribs it doesn't hurt him, though he can feel it, and the resounding smack which comes from it is sufficient in volume to prompt the colt to go. Armed with it, we mount. The colt stands still, and you will notice as you swing on that uncertain swaying which comes from the horse. That, I think, is the little fellow learning to balance his load. He has never carried anything in his life before, and though he is bred to it he has to learn to balance before he can do anything else. We gather up the reins, seat ourselves comfortably in the saddle, and from the custom of long habit we give the reins a little shake and use the customary means to urge our mount to move. He does not! He hasn't the faintest idea what is wanted of him, and he stands and sways a little. When our heels hit him he might move forward sluggishly, not knowing what to do, and then the length of garden hose flops on his ribs.

This does something. The colt gives a bit of a bound, catches himself in the air, as it were, and steadies himself to balance his load. At that unwonted action the girths might pinch a bit, the saddle may be uncomfortable, and the colt decides to shift them. He knows only one way, that handed down a long line of ancestors as the proper means to shift anything—from a beast of prey to an unwanted rider—and he humps his back, lowers his head and tries to buck. A colt ridden the first time may buck. I use the word "may" to denote the mere possibility. Usually he cannot.

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* From the "Pastoral Review" for September, 1928. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), and January (1929) Journals, from the February, April, May, and July numbers of the "Pastoral Review."

Before a horse can buck he has got to be able to balance his load. A colt ridden the first time may only do that to a very weak extent. There are exceptions, of course, but I'm not referring to odd cases here. As soon as he has given his little display, and provided you are still on top, of course, your first and most important job is to soothe him. Let the little fellow know that there's nothing to hurt him, coax him to do another stride or two, and on the completion of each little forward motion tell him with all the earnestness you possess that he is a little marvel, there never was another like him, and to keep going. After riding him round the yard you will dismount and impress upon him the wonder of his progress, then ride him round the yard several times, across it, and do a few figures of 8 before the gate is opened and you take him outside.

### Accustom the Colt to His Load.

When taking the colt outside, if it is possible at all, it makes the job so much easier if you have a man mounted on the old coacher. That merely serves as an inducement to go and do likewise when the old horse is ridden away. If there is no coacher, it really doesn't matter to any great extent. You go on your own. Some colts, as soon as they leave the confines of the yard, might be inclined to think that freedom is again theirs and go, or try to go, bush. Others need urging to do anything at all. And then there are others which will only progress in a series of erratic bounces, which the uninitiated call bucking. It isn't. Bucking, proper bucking, is an art which takes time to acquire. In whatever way your youngster gets over the ground you should mix it with him mentally the whole time. Drastic measures in correction are foolish at this stage of the game, and the object of the first riding is merely to try and accustom the colt to his load, to allow him to gain a certain degree of confidence, and to get him to move freely if possible. But even thus early I would impress on you the matter of educating the colt's mouth. For the love of goodness don't hang to it as though it were a sheet anchor, or a mainstay of some sort. A colt's mouth is for his guidance only, and for such a purpose alone may it be used. Gauge if you can the degree of pull which he is exerting, and against it use enough, and only enough, counter strength to achieve your own purpose. Never put more than half an ounce more weight on the reins than is necessary. Handle a colt's mouth lightly, with judgment and sympathy, and you have a horse which is responsive to your lightest touch and merest wish. It is worth doing, and it can be done in a manner which is not irksome either to rider or to beast.

### Make the First Journey a Short One.

About half an hour's riding is quite sufficient for a start. Above all else, we do not want to weary this youngster in any of his lessons. Of course, tales are told of horses which have been ridden up to 40 miles on the day they were first mounted. Such things may be possible with an aged colt, but I wouldn't give you threepence a dozen for that fellow afterwards. In common with almost all other animals, a horse has only one really big day, or event, in him. When you have drained that you've sapped his vitality. That is the case nine times out of ten. To ride a colt 40 miles on his breaking day is equal to a ride of 100 miles or more when he is a set worker. A number of horses may do a stage of that sort and yet be able to come again. And a number, even of the good ones, may only do one stupendous day, and for ever after they are at the limit with just ordinary work. That is not included in the work of breaking, and I throw it in for good measure and merely as my own opinion.

### Educating the Colt.

When you let the colt go after his first ride you may, or you may not, increase his education. Whether you do, or whether you don't, I would ask you particularly to try and impress on that child horse that he has done a good day's work, and that you are proud of him, that he should be proud of himself, and that to-morrow and the next day he is going to improve all the time. The rest of his breaking is merely a repetition, given over and over again, *ad nauseam*, till the youngster gains ease and proficiency in his work. Particularly I would ask of you when unsaddling to drag the saddle and gear off. Don't snap it away as if it was something which would bite him, but draw it away slowly, letting the girths and leathers caress him as they slide over his back, and in every way try and avoid frightening him of anything. The surest way of allaying a young horse's fears, I have found, is to let him know by every action of your own that there is nothing of which he should be afraid. Above all else, don't let him think you are in any way frightened, for as sure as eggs you will find that a horse borrows from and adopts something of the character of his rider. An excitable man will have excitable horses, nervousness begets fear, a

casual don't-care-a-cuss man will have similar horses, and he who is of a slow mentality and stubborn should never inflict upon horses his personality. I'm lecturing a dickens of a lot, and doing little. Let's do something.

### Strong Gear Needed

We will now proceed, ladies and gentlemen, to give a demonstration of how a horse is taught to tie up. (These definitions make bad grammar. Fancy ending a sentence with a preposition!) To tie up a horse (that's better) we want strong gear. In fact, there's a halter and shank kept for this purpose alone. We catch our colt, tell him our usual plausible tale of how we are not going to hurt him and what a good little boy he is, and lead him to the post where this lesson is learned. It's a stout post, well and truly sunk and rammed, and to a swivel on top of it we attach the shank of the halter. If we have not got such a post, then we'll have to do the next best thing and tie him to a rail in the yard. But a post out in the centre of the yard, free of all encumbrances, is the thing. When the colt bounds, as he is going to do, he's not likely to get his legs tangled in the rails. He is not able to buck into the fence or skin his forehead, and when he throws himself on the ground and sulks, lying there with half-shut eyes and groaning grunts, he cannot get his legs under the bottom rail of the yard, and skin or break them when he struggles to rise. However, apart from anything else, the main thing is a halter which will stand the strain, and a shank which won't break. This is a negative lesson we are giving now—a thing which cannot be done—and we do not want to upset our good work by the shank parting and making liars of us and a bad example for the horse.

If a colt will not pull back it is advisable to make him do so? To a very slight extent, sir. If he won't take a strain it is not necessary to throw a bag at his head. As you walk by flit some dust in his face with a sideways kick of your boot. That will do it, and the horse does not know you are doing it on purpose. Anyway, if he doesn't pull at once, he will later on. If there is no other way of making him take hold, let some horses run through the yard past him and out of the gate. That will make him pull, and he has got to do so to find he cannot get away. You must lift a little hair and skin in this exercise, so please keep that fat-kerosene mixture handy. And if a colt lies down and grunts and will not pull, what about it then? A spreader is the thing for a colt like that. Get a spreader, lift it and tap one, two, three. That will bring him to his senses. Hit the colt? No. Hit that rope. The jar of it running through will bring him to his feet with a run, and also with a colt that sits back and hangs in the one position without a struggle, the spreader on that taut rope will also let him know he's not playing the game according to Hoyle.

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## THE DINGO—A FEW HINTS ON TRAPPING THE PEST.

Any discussions as to the possibilities of future development in the pastoral industry are generally concerned with breeding problems or the improvement of pastures by top-dressing, &c., and at the bottom of all of these suggestions is the one idea—an increased return per acre. It is contended, however, that it would not be possible, even by adopting these progressive methods, to maintain the carrying capacity of our pastoral country at its present level if means were not taken to cope with such pests as the rabbit, blowfly, and dingo. Just how much these pests decrease the carrying capacity, and consequently the return per acre, it would be most difficult to estimate, but it is generally agreed that the amount is considerable. It is also an interesting fact that the more work done in regard to the improvement of pastures and flocks, the greater is the attraction in many directions for these pests.

Periodically in these columns we have dealt with different aspects of the blowfly and rabbit problems, and it is intended now to treat with the trapping of dingoes as a method of exterminating that pest.

### TRAPPING

If trapping is practised on an extensive scale it would pay some owners to employ a professional trapper under somewhat the same conditions as those governing the employment of rabbit trappers, paying a bonus for scalps. A trapper can attend from 150 to 200 traps, and may have to cover the total distance of 150 to 200 miles. The following information is supplied to meet the needs of those who do not consider their holdings large enough or badly enough infested to warrant the employment of such trappers.

*The Traps.*—Traps may be obtained from most ironmongery stores. They are of different sizes, the type generally used weighing 8 lb., with a space of 8 inches square between the open jaws. The jaws are provided with teeth which should not be too sharp, otherwise the dog may have his leg amputated or, perhaps, his foot nipped off and become, although lame, extremely troublesome by reason of his sharpened wits. A trap should not be too sensitive, or it may be sprung by rabbits, &c. To test it, drop pieces of wood of different weights from a height of 2 feet on to the plate; the piece which just sets it off should weigh 2 oz., and if this is not so the trap should be adjusted. Always overhaul traps after they have been sprung, in case they should be damaged or wrenched in some way.

*Location of Traps.*—This depends solely on the particular class of country. Behind logs and stones, on old dry watercourses, unused roads, tracks, &c., in the vicinity of waterholes, clear patches in scrub, are all good places. It should be borne in mind that, although the dingo may seek his quarry by very crooked and roundabout tracks, he returns to his lair by the shortest route. Other traps may be set off the track near bushes, shrubs, &c.

*Setting the Trap.*—There is some diversity of opinion as to whether the dingo will approach a spot if he suspects that man has recently been there. This is probably only correct with the veterans who have learnt all that man can teach them about traps. The younger ones and less cunning members of the species are known to follow men at some distance along a path.

The spot having been selected, first dig a hole about the same size as the trap and sufficiently deep to have the plate about ¼ inch below the surface of the ground. Open the trap and place it in the hole, cover the jaws and plate with a piece of brown paper about 14 inches square. Do not use white paper, for should some of the soil blow away and the paper become exposed, dogs will become suspicious and avoid the spot. Now pack the earth firmly around the jaws and spring, and cover the whole with earth. Make the place appear as natural as possible by fanning the surface of the soil with a hat, also by avoiding leaving pieces of paper, &c., lying about. The proximity of the trap may be marked by a dead bush or some similar natural object.

Never fasten a trap to the ground, as the dog may be able to tear himself free. It is better to rely on tracking him. Some trappers prefer to place poison on the trap, as the dog often bites it in his endeavours to free himself. This, however, is a matter of personal opinion, both methods being worth a trial.

## DECOYS.

Several decoys have proved successful. Dragging the punctured carcass of a sheep over the ground by tying it to the axle of a cart and eventually leaving the carcass on the road in the line of traps is a good method.

Remember that most dogs would rather attack live sheep than dead ones, so that the paddock should be emptied before setting the traps, not only for the reason stated above, but also on account of the risk of sheep being caught by the very means which aim at their protection.

Oil of rhodium and oil of aniseed are frequently used, being placed in the boots of the trappers.

A live slut in heat led along the line of traps is an excellent method.

The dung of domestic dogs is perhaps one of the best decoys. Use about a dozen pellets and place the traps about 18 inches to 2 feet away, so that when the dingo approaches the decoy he will place his foot on the correct spot.

Dogs' urine is sometimes used, but is not always easy to obtain, and has to be renewed frequently owing to evaporation.

A excellent idea is to place the traps along the outside of a dog-proof fence; this will catch dogs that run along the fence seeking a place of ingress. If dogs have discovered a hole in the fence set a trap in the hole before repairing.

Traps should be inspected once or twice a week. In setting beside waterholes or under water where the track crosses a creek, it is desirable to approach the spot selected from the opposite side, wading through the water and thus leaving no tracks. In this case be sure that the trap is well greased before setting.—A.P. Notes, N.S.W. Dept. Ag.

## THE STANTHORPE DISTRICT.

*The following report (8th January, 1929) on the prospects of the Fruit Industry in the Stanthorpe district has been received by the Minister for Agriculture and Stock, the Hon. W. Forgan Smith, from Mr. H. St. J. Pratt, the Departmental representative in that district:—*

"Most of the stone fruit has been harvested at satisfactory prices; the crop has not been as heavy as last year, and all varieties matured at least a fortnight earlier. Very little fruit has been sent to the factory, and if only more growers would realise the necessity and advantage of thinning out the whole crop would have been absorbed by the fresh fruit market at good prices.

English plums—President, Pond's Seedling, Grand Duke—will be on the market within a few days. It is anticipated that the prices will be good.

### The Apple Crop.

The apple crop is about 30 per cent. lighter than last year, and the large quantities of Southern cold stored apples have had a very serious effect on prices for early varieties.

There will be a heavy crop of Jonathans this year, but other varieties will be considerably lighter, and it is expected that the prices towards the end of January and the months of February and March will be so much in excess of last year's that nett returns will be equalled if not exceeded.

### Grapes.

The grape crop promises to be very satisfactory. The weather conditions so far have been most suitable, and there is very little disease in evidence—a great improvement on last year.

The earlier varieties will be on the market in about ten days.

The fruit fly "Dacus Tryoni" has done but very little damage so far, and up to the present no complaints have been received from Brisbane in that direction—to what extent the district will be invaded by the species "Jarvisii" yet remains to be seen, but will be known within the next month.

### Vegetables.

Vegetables play a very prominent part in practically every orchard, and this season have been very much more remunerative than last season.

Many growers have done, and are doing, well out of beans, cabbages, and carrots.

Tomatoes will be on the light side this season, and it is expected that the factory supplies will be small. It is becoming more difficult every year to grow tomatoes successfully, and this is to a great extent attributable to the haphazard, happy-go-lucky methods of raising the plants in the seed beds. They are nearly always sown far too thickly, with the result that the plants are very weak and more subject to the many ills tomatoes are liable to contract.

The district, on the whole, is on the upward grade—there is a far better tone, and a feeling of optimism and security is in the air.

### Marketing.

More growers are alive to the necessity of finding their own markets and avoiding the sending of large quantities of fruit and vegetables to the Brisbane markets. Many growers, through using a little initiative, have been enabled to dispose of practically the whole of their output privately, eliminating Brisbane altogether, which has been very much to their advantage.

Though a large number of deserted orchards have during the last few months been destroyed, there is still a considerable number that should be dealt with similarly before next season. They produce a quantity of inferior fruit which reduces the price of the good fruit grown by the bona fide orchardist. The original owners were unable to make a living off them, and the present tenants who take them on for the season are in most cases bitterly disappointed as to the results.

I am of the opinion that Stanthorpe has at last turned the corner, as it were, has to a great extent thrown off the ill effects of the boom, and each succeeding year will, I believe, bring greater prosperity to the district.

# Answers to Correspondents.

## An Ailing Draught Horse.

A Chowey farmer writes:—Some time ago one of my draught horses became sick. I first noticed this when I drove him to water. He was very reluctant to go. He was very stiff, particularly in the hind quarters, and I had quite a job to turn him round. I drenched him with linseed oil and saltpetre, as on a previous occasion he had some urinary disorder, the urine being nearly black in colour. He would stay in the shed all day, only going out to graze at evening. I was feeding him on lucerne chaff, and he seemed to be getting right, as all stiffness left him. I then noticed a swelling on the under part of his chest, spreading back towards the belly, and at first was quite soft, afterwards being harder. He had difficulty in eating and drinking for a time, afterwards gradually becoming better, until he was quite normal. A cough, which ended in a sort of a whistle, developed, with a slight running from the nose. The droppings at this stage were of a very green colour, intermingled with a sort of a white slime. Later on the horse was to all outward appearance quite fit, except for the swelling under his chest. His hocks began to swell, also the thighs and buttocks and the shoulder muscles (or rather the muscle above the brand). He began to go off his feed and drink and appeared to be very full, would blow very much with the slightest exertion, and in, say, 200 yards would have to stop for a breather. I had a last look at him for the night and he was quite all right, nibbling round the shed, and in the morning he was dead, having to all appearance died without a struggle. If you could tell me what the trouble was I would appreciate it very much, as several neighbours were interested in the symptoms produced."

Mr. Veterinary Surgeon McGown advises:—"The symptoms described in this case are very conflicting, as they point to various diseases, and it is therefore very difficult to form a correct diagnosis. However, from the information given it appears that this animal was suffering from some form of kidney trouble. Had the kidneys been sent to this Department for examination the answer would have been more satisfactory."

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## BOTANY.

*From the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.*

### lathus or Net Fungus.

INQUIRER (Brisbane)—

The fungus is a species of Clathus or net fungus. The net fungi belong to the family Phalloideæ or stinkhorn fungi. The peculiarity of the members of this family is that the spores are borne in a wet, slimy, brown medium known as the gleba. In the net fungi the gleba is borne on the inner face of the meshes. Flies and other carrion-feeding insects visit the gleba and carry about the spores on their bodies, and thus the plant is spread.

### Woods Identified.

J.S. (Woombye)—The three weeds are—

1. *Euthorbia pilulifera*, the asthma weed.—This plant is a very common weed in cultivation in Queensland, and attracted much attention some years ago as affording relief to persons suffering from asthma. The whole herb was dried and used as a tea about the same strength as ordinary tea. It seems to give relief, but the effects apparently wear off after a short time.
2. *Richardsonia scabia.*—This plant was "boomed" some years ago as a fodder under the name of Mexican clover. It does not, however, belong to the true clover family, and as far as our experience goes in Queensland seems to be left untouched by stock. It is rather a bad weed in cultivation, particularly in the pineapple plantations of the North Coast Line.
3. *Oxalis corymbosa*, a species of wood sorrel most commonly known in Queensland simply as Oxalis. It is a pernicious weed in gardens and does not seem to be particularly bad in large areas. It is a native of South America, and was probably introduced as an ornamental plant, as many of the genus are rather pretty and favourites in garden culture.

### Wild Poppy—A Poisonous Plant.

J.W. (Cooroy)—

The plant commonly known as the Wild Poppy in Queensland is *Argemone mexicana*, variety *ochroleuca*, known by its rather silvery, prickly leaves and very pale yellow flowers. It is poisonous to stock, but is generally left untouched by them. The only cases we have on record of poisoning by it are some where the plant had been cut and allowed to wilt and then eaten by calves.

### Tree Lucerne.

A.H. (Killara, Sydney)—

The true Tree Lucerne (*Medicago arborea*) seems to have died out entirely in Queensland. It has been introduced into various countries, but never seems to have taken on as a fodder crop. Professor N. E. Hansen, who was the first agricultural explorer appointed by the United States Department of Agriculture under their scheme of foreign exploration, visited various parts of Europe and Asia to especially collect seeds of species of *Medicago*, *Trifolium*, and allied plants and reported on *Medicago arborea* as follows:—

"*Medicago arborea* L. is the largest representative of the Medicago genus, attaining a height of upwards of 10 feet. It is a native of the Mediterranean region of Europe, Asia, and North Africa, and is the 'cytisus' mentioned by ancient Greek and Roman writers as an excellent forage plant. It is especially common on the islands of the Greek archipelago and in southern Italy. It is cultivated to a limited extent in various portions of its range, but, as it gets woody too quickly and is less productive, the ordinary lucerne is much more in favour. It is a favourite wild plant, as it furnishes rich feed for cattle, sheep, and goats. In old plants the wood is dark and hard like ebony, and its use for sabre handles, canes, and beads is recorded.

"The writer's personal observations in gathering wild seeds of this plant are confined to Mount Lycabetos in Athens, near Mars Hill, on which the apostle Paul preached to the Athenians, and to the cliffs near the outskirts of Naples, Italy, where the plants were found growing in the crevices of rocks, where they were inaccessible to any live stock. The plants seemed to flourish in the driest possible crevices in almost perpendicular cliffs, where, apparently, no water could get to them.

"*Medicago arborea* appears of value in hot, dry places where few other plants will live, but its greatest value is perhaps to be looked for from the standpoint of breeding. Some of its remarkable vigour could with advantage be imparted to the other Medicagos of more northern origin. This species has been tried in a limited way in Southern California as an ornamental plant, and north of its main range in Europe is considered only as an ornamental shrub, needing winter protection. The large, bright yellow flowers are abundantly produced."

It seems to have some virtue as a fodder for fairly dry, hot countries and should be a success in parts of Queensland and New South Wales, though we doubt if it has many advantages over a lot of the existing fodders we have here already.

### Grass Identified (*Cenchrus australis*).

G.B. (Degilbo)—

Your specimen is *Cenchrus australis*, a hillside grass or scrub grass. It is also commonly known in Queensland by the ridiculous name of Scotchman's lice. It is a very coarse grass, and has little value as a fodder on this account. The prickly burrs often catch flies and other insects.

### Bird of Paradise Flower.

J.D. (Mt. Tambourine)—

Your specimen is *Phitecolobium grandiflorum*, known on Tambourine and other places as Bird of Paradise Flower, Rainbow Flower, Tassel Flower, and other names. The genus Phitecolobium is one widely spread over the tropics, and several species occur in Queensland. The timber is often rather prettily streaked, and from this character is sometimes known as bacon wood.

### A Common Weed (*Cleome aculeata*).

L.L. (Cairns)—

Your specimen is *Cleome aculeata*, a small plant of the caper family, a native of tropical America now a common naturalised weed in the East Indies, and introduced into Queensland within recent years probably from either Java or Singapore. Though the plant is fairly common, we do not know an English name applied to it. The plant so far has not manifested itself as a bad weed, and does not seem to call for any special method of eradication.

### Nut Grass Eradication.

G.S. (Rosewood)—

The Director of Agriculture, Mr. H. C. Quodling, advises that no method of total eradication has so far been discovered for this pest. Some permanent crop, such as lucerne, will undoubtedly keep it temporarily suppressed, and other quick-growing crops such as, Japanese Millet, White Panicum, Giant Panicum, and Soudan Grass, are useful during the summer months, whilst Wheat (preferably Florence in your district), Skinless and Cape Barley, Algerian, Ruakura, or Sunrise Oats can be utilised during the winter months.

The insect referred to by you is probably that known as *Antonina australis* or Nut Grass coccid. This insect is frequently found feeding on the underground portions of Nut Grass, but in spite of its association with that plant it is not regarded favourably as a control factor. It is certainly incapable of killing out Nut Grass where normal cultivation operations are carried out, but it is claimed as being beneficial where the land in which Nut Grass is growing has not been disturbed for some time. As it is suspected that this insect may feed on the roots of other grasses, its general distribution should not be undertaken, at least for the present or until more is known about it.

### Wild Millet.

F.L.H. (Memerambi, Nanango Line)—

Your specimen is *Panicum crus-galli*, commonly known as the wild millet. It is a grass with a wide distribution over the warmer parts of the world, and several forms occur in Queensland, the one you sent being most abundant as a weed in cultivation. The grass has some considerable value as a fodder and is generally regarded as the parent of such well-known fodders as Japanese Millet and White Panicum.

### Curative Plants.

F.A. (Cairns)—

Your specimen is *Coelospermum reticulatum*, a shrub of the family Rubiaceæ, very common in Queensland, with a fairly wide range from Gladstone to the Cairns district, growing in rather dry country. Though common, we have not heard a local name for it or of its possessing any curative properties for diarrhœa.

A plant very common in parts of North Queensland, particularly in the Gulf country, is *Grewia polygona;* this plant has important value as a cure for diarrhœa, dysentery, &c., the leaves being either chewed or made into a decoction.

### "Curled Dock."

M.R. (Warwick)—

In sending specimens of weeds such as Dock, it is better to send a piece of the seed-head and the leaf rather than the clean seeds. However, the seeds you send belong to *Rumex crispus*, the "Curled Dock," a very common plant, widely spread as a weed over practically the whole of the temperate regions of the world, and very common as a farm weed in Queensland. The plant is not known to possess any poisonous properties. Birds are very fond of the seeds, and the roots are used in medicine.

### "Sovereign Wood."

J.L.T. (Atherton)—

Your specimen is *Terminalia sericocarpa*, in some places known as Sovereign Wood on account of the yellow timber; in other places known as Damson on account of the drupaceous fruit.

### Trees Suitable for the Roma District.

H.J.S. (Roma)—

Write to Mr. G. B. Brooks, Department of Agriculture, Rockhampton, who, no doubt, will be able to supply you with a few seeds of the Algaroba. The trees likely to grow well at Mount Abundance are:—

Kurrajong (*Sterculia diversifolia*).

*Celtis sinensis*, commonly known in Queensland as Portuguese Elm. This tree does well in Western Queensland, and has some reputation as a fodder. We could, perhaps, send you a few seeds as we do not think they can be obtained from nurserymen.

Pepper Tree (*Schinas molle*).

Crow's Ash (*Flindersia australis*).

Moreton Bay Fig (*Ficus macrophilla*).

Citron-scented Gum (*Eucalyptus citriodora*).

Jacaranda (*Jacaranda mimosæfolia*).

Camphor laurel (*Cinnamomum camphora*).

Phytolacca or Bellasombra Tree (*Phytolacca dioica*).—This tree is a rapid grower and has some considerable value as a fodder tree. We do not think seeds can be obtained through the ordinary commercial channels, but you may obtain some from Mr. R. Dick, Purga, via Ipswich. He sells seeds, we understand, at 2s. a large packet.

Bunya Pine (*Araucaria bidwillii*).

Hoop Pine (*Araucaria Cunninghamii*).

Insignis Pine (*Pinus insignis*).

### The Bottle Tree.

E.D.B. (Biggenden)—

1. Two species of Bottle Tree occur in Queensland, the Broad Leaf Bottle Tree (*Sterculia trichasiphon*) and the Narrow Leaf Bottle Tree (*Sterculia rupestrus*). The latter is the species that forms the perfect bottle-shape trunks, and it is confined to Queensland. The former is recorded from the Northern Territory as well as Queensland.
2. These are really the only two kinds of "bottle" tree. There is another species of Sterculia known in Queensland as the Scrub Bottle Tree (*Sterculia discolor*). It is common in the coastal scrubs of Southern Queensland, but the stems do not form a perfect bottle; they are simply stout and soft.
3. There is no cheap botanical handbook to enable you to identify Queensland wild flowers. The "Queensland Flora," by the late F. M. Bailey, price 30s. for a set of six volumes, is, perhaps, rather too big for your purpose. We would gladly name any specimens you care to send from time to time, and when perhaps you get to know the plants a bit better, you could obtain a copy of "The Queensland Flora" and use it to advantage.

### Birdlime Tree.

C. (Cedar Creek, via Beenleigh)—

Your specimen is *Cordia myxa*, sometimes known as the Birdlime Tree owing to the sticky nature of the fruit pulp in the ripe fruits. It is a tree with a very wide distribution through North Australia to India, Ceylon, and as far west as Egypt, and is thought to have furnished the wood from which the Egyptians constructed their mummy cases. Its dried fruit is used in India as a medicine and is said to be purgative.

## PIG RAISING.

*From the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton.*

### Worms and Lice in Pigs.

G.W.B. (Umbiram)—

Your pigs are suffering from lice and, probably, worms as well. Thoroughly clean the pens, sheds, yards, and troughs, and let the sunlight get into every corner. Troughs should be cleaned frequently and regularly. Probably all the pigs are infested with hog lice, which are usually found behind the ears and under the body on the inside of the legs, where they lay their tiny white eggs. To kill lice, mix six parts of any waste oil, such as old motor oil or fish oil, with one part of kerosene, and apply the mixture by a cloth or brush to every part of each pig, including the insides of the ears. This treatment should be repeated four or five days after the first application, when more lice eggs will have hatched out. Another fairly satisfactory way of applying this mixture is by saturating a piece of bagging in the oil and kerosene and tying it around a solid post in the pig yard, and the pigs will rub themselves against it, but for immediate results it would be better to apply it by hand. Then, if practicable, spray all cracks and crevices about the pens with a weak solution of any disinfectant to kill any lice which may be lying about. To treat for worms a dose of turpentine and castor oil is most satisfactory. For a pig weighing 100 lb. live weight a dose would be half a teaspoonful of turpentine mixed with two tablespoonfuls of castor oil, and this dose should be mixed with a little warm skim milk and fed in the troughs first thing in the morning, the pigs having been starved since the previous morning's feed. The dose should be adjusted to suit the size of the pigs, and care should be taken to see that the pigs all get their share of the medicine in the milk. This dose of oil and turps should be repeated ten or twelve days later. Remember that medicinal treatment is of little use unless proper sanitation of the piggery is carried out. Burn up all the present bedding in the pens. A plentiful supply of greenstuff, preferably lucerne, is always beneficial for pigs of all ages.

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## OBITUARY.

### HENRY CRAMER HAWTHORN.

On the 26th December last the death occurred at Warwick of Mr. H. C. Hawthorn, Inspector of Stock for the Warwick district. The late Mr. Hawthorn was sixty-two years of age, and, prior to entering the service, was very well known in pastoral circles on the Downs and elsewhere in the State. A native of Tasmania he was attracted to the mainland by the wider opportunties offering in the pastoral business. As a stockman his ability was quickly recognised, and he was appointed overseer on Glengallan Station, where he remained for a number of years. Later on he took over the management from time to time of several large Western properties, including Coreena Station, near Barcaldine. He afterwards held a responsible position at the Government Stock Experiment Station at Yeerongpilly for a considerable time. Later Mr. Hawthorn was appointed to the charge of the Stock Office at Killarney, where he remained for a number of years. He was subsequently appointed Stock Inspector at Barcaldine, and six years later was transferred to Warwick. Throughout most of the pastoral areas of the State, but particularly on the Downs and in the south-west, Mr. Hawthorn was greatly esteemed, and his sound knowledge of stock and pastoral experience were always at the disposal of farmers and graziers, by whom he was highly appreciated as a courteous and able officer. The late Mr. Hawthorn left a widow and grown-up family, to whom the Minister and officers of the Department of Agriculture and Stock have extended their deepest sympathy. The officers of the Stock Branch especially feel the double loss of capable colleagues in both Mr. Hawthorn and Mr. Smith.

## GEORGE ANDREW SMITH.

The death of Mr. G. A. Smith, Inspector of Slaughter-houses, Rockhampton, on the 22nd of December last, as the result of a motor accident, was generally regretted, not only in the service, but among all sections of the community which he served so well. The late officer entered the public service in February, 1915, after having passed the prescribed examination, and was stationed from time to time at Toowoomba, Mackay, Gympie, Charters Towers, and Rockhampton. He was only forty-seven years of age at the time of his death, and left a widow and one child. Included among many expressions of sorrow and sympathy were messages from the Minister and officers of the Department of Agriculture and Stock.

## EDWIN LYLE VIDLER.

The news of the tragic and lonely death of Mr. Edwin Lyle Vidler, as the result of an accident whilst climbing Mount Lindesay, a high peak of the Macpherson Range, on 26th December, was received with profound regret. The late Mr. Vidler was barely twenty-three years of age. He was educated at the Toowoomba Grammar School, and passed the Junior University examination with merit in science subjects. He joined the staff of the Department of Agriculture and Stock in July, 1924, and served in several branches, finally transferring to the chemical laboratory.

The deceased was a young man of striking individuality. He was not attracted by any organised sport, but found an outlet for his remarkable energy in photographic tours across open country and on precipitous heights. He was an intrepid and experienced mountain climber. In company with his friend, Mr. A. A. Salmon, a fellow-officer of this Department, and his companion on many adventurous excursions, he had climbed the chief peaks of the Glass Houses and other mountains, and, in one instance, out of sheer enthusiasm, he made a thrilling ascent of Crookneck in record time. At Easter, 1928, with Mr. Salmon, he climbed Mount Lindesay successfully from the eastern side. He left Brisbane on the 24th December to attempt the ascent by the difficult northern face alone, as he was unable to obtain a companion. The mountaineer's long-delayed return caused a party to set out on the 29th, and after an arduous and perilous search his body was found by his comrade, Mr. Salmon, at the foot of a crevice at a height of about 3,400 feet. It is presumed that he met his lonely death on 26th December by the loosening of a piece of rock upon which he depended, and falling, was killed instantaneously. Owing to the inaccessible nature of the country his remains were laid to rest near the spot where his friends found him.

All those who knew the deceased feel the loss of one whose mercurial temperament and bright personality were as a freshening breeze to more stolid natures. He was a very fine type of young man, studious and assiduous, a general favourite of the officers of the Department, and gave promise of becoming a valued officer and citizen. Had he lived longer his amazing vitality could not but have left its mark in the world.

Like so many other good Australians, the very glory of unconquerable youth, who set out for other and foreign fields to achieve a lofty purpose only to fall a willing sacrifice, he was buried where he fell. He rests in the shadow of the stark escarpment he assailed rising sheer above him, sheltered at its base by the bush he loved so well and with the birds he also loved to chant for him a never-ending requiem. The inexpressibly sad little ceremony of interment was performed early on New Year's Day. The police were assisted by two local gentlemen and three members of the search party. Constable Carter conducted a brief funeral service. At the head of the grave stands a neat cross made of hardwood by the dead man's cousin, Mr. Victor King. On the cross is a leaden plate carrying the name and age of the deceased, and the date of his death. A cairn of stones was built to definitely mark the spot.

On behalf of the Minister for Agriculture and Stock (Mr. W. Forgan Smith), the Under Secretary (Mr. E. Graham), the Assistant Under Secretary (Mr. R. Wilson), and other officers of the Department, a letter of condolence was sent to the father of the deceased, who is a resident of Bell.

# General Notes.

## Staff Changes and Appointments.

Mr. J. L. F. Foran, Stock Experiment Station, Townsville, has been seconded for duty to the Agricultural Chemical Laboratory, Brisbane.

Messrs. C. F. Andrews and T. Jones, of Tamaree, have been appointed Honorary Inspectors under and for the purposes of the Diseases in Plants Acts.

Government Representatives have been appointed and Members elected to the following Dingo Boards:—

Bungil Dingo Board—Mr. W. H. Thrupp, Roma, Government Representative; Messrs. C. Harms, P. Hoskin, G. F. Lalor, and H. H. McGowan, Members.

Mitchell West Dingo Board—The District Inspector of Stock, Longreach, Government Representative; Messrs. T. S. L. Armstrong, W. G. C. Avery, A. A. Moffat, and R. J. Willcocks, Members.

Leichhardt South Dingo Board—The District Inspector of Stock, Emerald, Government Representative; Messrs. M. M. Kavanagh, J. F. Le Feuvre, W. T. M. Penhalluriek, and J. C. Wells, Members.

Messrs. A. H. Bauman and C. E. Holmes, of Charters Towers and Townsville, respectively, have been appointed Temporary Rangers under the Animals and Birds Acts, as from the 19th February, 1929.

Constables E. W. Conway and J. H. Gordon, of Gilliat and Dobbyn, respectively, have been appointed Inspectors of Slaughter-houses.

Appointments and elections made in connection with the undermentioned Dingo Boards:—

Bulloo Dingo Board—Mr. W. Williams, Thargomindah, Government Representative; Messrs. E. A. Sherwin, H. M. L. Hughes, H. L. Rutledge, and W. Carwardine, Members.

Belyando Dingo Board—The Inspector of Stock, Clermont, Government Representative; Messrs. W. R. Tindale, T. P. McCann, H. R. Goodwin, and W. E. Moller, Members.

Clermont Dingo Board—Mr. H. C. S. Griffin, Folfang, Clermont, Government Representative; Messrs. E. H. Templeton, K. Maclean, F. N. W. Cavaye, and W. J. Clements, Members.

Dr. H. W. Kerr, M.Sc., Ph.D., Sugar Soil Chemist, Bureau of Sugar Experiment Stations, has been appointed Acting Director of Sugar Experiment Stations as from 1st February, 1929, and during the absence of Mr. Easterby (Director) on leave.

Mr. S. Graham, of Upper Coomera, S.C. Line, has been appointed Honorary Inspector under the Diseases in Plants Acts.

Mr. J. T. Tod, of Goomburra, has been appointed Growers' Representative for District No. 4 on the Wheat Board until the 31st August, 1929.

The appointment of the Officer in Charge of Police at Mareeba as Acting Inspector of Stock has been cancelled as from 31st December, 1928.

Constable H. H. Taylor, of Kuridala, has been appointed Inspector of Slaughter-houses, as from 4th December, 1928.

Mr. H. V. King, of Toowoomba, has been appointed Government Representative on the Darling Downs Dingo Board, and Messrs. C. J. Allen, A. C. V. Bligh, C. Cocke, and E. R Rutledge have been elected Members of that Board.

Mr. L. A. MacKenzie, of Telson, Dingo, has been appointed Government Representative on the Leichhardt East Dingo Board, and Messrs. C. A. Barnard, C. Dobbs, J. W. McKenzie, and A. J. Salsbury have been elected Members of that Board.

Mr. G. Burton, of Cambooya, has been appointed Chairman of the Canary Seed Board until 28th February, 1930.

It has been approved that the lands of the canegrowers in the Mackay District who supplied cane to the Proserpine Central Sugar Mill during the 1928 season, be included in the Mackay Cane Pest Infected Area.

The following have been appointed Members of the Northern Pig Board:—Messrs. F. H. Hyde, Peeramon; C. A. Hough, Tolga; D. Johnston, Malanda; R. T. Croker, Malanda; R. Campbell, Peeramon; and L. R. Macgregor, Director of Marketing. They will hold office as from 1st January, 1929, to 31st December, 1929.

The position of Sales and Possessions Officer, Agricultural Bank, Brisbane, has been abolished.

The appointment of Mr. L. J. W. Taylor, as Inspector, Agricultural Bank, has been confirmed, as from 14th May, 1928.

The appointment of Mr. E. W. Weller, formerly of Birkdale, as Honorary Inspector, Diseases in Plants Acts, has been rescinded.

The following appointments have been made in the Bureau of Sugar Experiment Stations:—

Mr. A. F. Bell, B.Sc., Investigations Officer (Plant Pathology), to be Sugar Cane Pathologist;

Mr. N. Bennett, B.Sc., Investigations Officer (Sugar Mill Technology), to be Sugar Technologist and

Mr. H. W. Kerr, M.Sc., Investigations Officer (Soils), to be Sugar Soil Chemist;

as from 1st January, 1929.

Messrs. M. Flanagan (Brisbane), A. Black (Maryborough), F. A. Johnson (Maryborough), and W. L. Conn (Charters Towers), have been appointed Inspectors of Slaughter-houses, on probation.

Mr. D. A. Logan, Inspector of Stock, Mackay, has been appointed also Inspector under the Diseases in Plants Acts.

Mr. T. Tobin, of Round Mountain, Gatton, has again been appointed Government Representative on the West Moreton Dingo Board, and Messrs. H. H. Daniel, P. Dwyer, J. Logan, and J. H. Pitman have been elected Members of that Board.

Messrs. F. Tickle and M. B. Smith, of Mooloo, via Gympie, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

Messrs. C. S. Clydesdale and J. J. McKeon, Assistant Instructors in Agriculture, have been appointed Instructors in Agriculture as from 1st July, 1928; Mr. L. A. Downey, Assistant Instructor in Pig Raising has been appointed Instructor in Pig Raising as from 1st July, 1928; and Messrs. A. Nagle and R. E. Haseler, Field Assistants, have been appointed Instructors in Cotton Culture as from 1st July, 1928.

Messrs. M. Coleman (Nobby), G. Burton (Cambooya), and L. R. Macgregor (Director of Marketing), have been appointed Members of the Canary Seed Board, as from 1st December, 1928, to 28th February, 1930.

The Officer in Charge of Police at Julia Creek has been appointed Acting Inspector of Stock.

The appointment of Mr. B. Dunbavand, as Inspector of Slaughter-houses, Ingham, has been confirmed, as from 1st June, 1928.

The Mining Warden and Police Magistrate, Charters Towers, has been appointed Government Representative on the Dalrymple Dingo Board, and the following have been elected Members of that Board:—Messrs. T. J. Salmon, A. Shepherd, E. E. D. White, and C. Woodburn.

Messrs. H. E. E. Larsen, E. P. Damm, A. O. Rohde, and S. Ukran, of Goomboorian, via Gympie, and Messrs. H. W. Baker, W. R. Perkins, and H. C. Poulsen, of Mooloolah, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

The appointment of Mr. J. King, as Inspector, Agricultural Bank, has been confirmed, as from 15th May, 1928.

Mr. G. Bates, Assistant to Entomologist, has been appointed Assistant Entomologist, Bureau of Sugar Experiment Stations, as from 28th April, 1929.

The Officer in Charge of Police, Inglewood, has been appointed Acting Inspector of Stock.

It has been approved that Mr. R. Pusey, Inspector of Stock at Muttaburra, be transferred to the South Burnett Cleansing Area, and that Mr. T. Douglas be appointed Inspector of Stock. Mr. Douglas's headquarters will be at Kingaroy.

The services of Mr. H. J. Walker as Temporary Stock Assistant, Brisbane, will be continued from 1st January, 1929, to 30th June, 1929.

Mr. J. McLaren, Cunnamulla, has been appointed Government Representative on the Paroo Dingo Board, and Messrs. F. H. Cuzens, C. C. Campbell, A. Leeds, junr., and W. H. Young have been elected Members of that Board.

Mr. P. J. Short has been appointed Temporary Inspector of Slaughter-houses as from 4th February, 1929, to 20th March, 1929, and Mr. F. C. Shaw has been appointed Temporary Assistant Inspector of Stock and Slaughter-houses from 7th January, 1929, to 1st February, 1929.

Mr. R. B. Morwood, M.Sc., Assistant to Pathologist, has been appointed Assistant Pathologist as from 1st January, 1929.

### Stock Foods Regulations.

In consequence of the amendment by Parliament during the recent session of "*The Stock Foods Act of* 1919," all Regulations under that Act have been revoked, and new Regulations approved.

### Local Sugar Cane Prices Boards.

By Order in Council under the Regulation of Sugar Cane Prices Acts, members of all Local Sugar Cane Prices Boards have been removed, in order to prepare the way for the usual annual elections.

### Grade Standards for Oranges and Mandarins.

In addition to the grade standards for cavendish bananas mentioned previously, the grade standards for oranges and mandarins, approved under the Fruit and Vegetables Act, have been amended. The new standards are as follow:—

Oranges and mandarins shall be sized into the following sizes—2¼ inches, 2½ inches, 2¾ inches, and "large":—

2¼ inches shall include fruit of a size of 2¼ inches or greater diameter, but less than 2½ inches;

2½ inches shall include fruit of a size of 2½ inches or greater diameter, but less than 2¾ inches;

2¾ inches shall include fruit of a size of 2¾ inches or greater diameter, but less than 3 inches;

"Large" shall include fruit of a size of 3 inches or over in diameter.

### Wheat Board.

Notice has been issued of intention to constitute a Wheat Board under and for the purposes of "*The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1928" (instead of under the original Wheat Pool Acts), such Board to deal with wheat produced in Queensland during the seasons 1929-30, 1930-31, 1931-32, and 1932-33. The Board, if constituted, will consist of five elected representatives of growers and the Director of Marketing. One representative shall be elected from each of the five districts at present used for the existing Wheat Board. Persons eligible to vote on any referendum or election in connection with the proposed Board shall be persons who at any time during the twelve months immediately preceding the date of such referendum or election grew for sale wheat in any portion of Queensland.

Any petition for a poll to decide whether the proposed Board shall be constituted must be signed by at least fifty growers as above, and must reach the Minister on or before the twenty-seventh day of February, 1929. Persons who have grown or who have growing for sale wheat, since 1st January, 1928, are invited to send their names and addresses to the Under Secretary, Department of Agriculture and Stock, Brisbane.

### Border Restrictions.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, announced recently that his attention had been drawn to a paragraph headed "Border Restrictions Modified," which appeared in the morning papers of the 16th instant.

The matter referred to therein has been, and is at present the subject of correspondence between the Minister for Agriculture in New South Wales and himself. Mr. Smith mentioned that he had received intimation from Mr. Thorby, Minister for Agriculture, New South Wales, of the intention of the Minister to modify some of the conditions relative to stock proceeding from Queensland to New South Wales, but until such time as these matters had been gazetted they would not have the force of law, or be applicable to stock intended for the Southern States. He refrained from making an announcement of this matter until finality had been attained, for, in addition to the matters referred to in the Press references, there were further matters which he had brought under the notice of Mr. Thorby, and he anticipated receiving a reply from him upon these matters at an early date.

It is possible that Mr. Russell, M.L.A., had been advised of the communication that had been received by him from Mr. Thorby, but, of course, until the changes in the conditions were effected by "Gazette" notice, the existing regulations stood.

When the proposed alterations become law he will advise stock owners of the changed conditions governing the movement of stock over the Southern border.

### Banana Weevil Borer Investigation Committee.

Following on the change in membership of the Banana Sectional Group, Regulation 127 under the Fruit Marketing Organisation Acts has been amended to provide that Messrs. F. J. Calvert, Mount Mellum, Landsborough, and C. E. Vines, Kin Kin, via Cooran, take the place of Messrs. Edwards and Warland, on the Investigation Committee formed in connection with the offering of a reward for an effective scheme of treatment for the control of the banana weevil borer.

### Drainage of Irrigated Lands at Theodore.

"T.A.G." (Theodore, Dawson Valley) writes:—Going over the irrigated blocks on which cotton, maize, and lucerne is growing one finds dead patches due to waterlogging. This can only be remedied by better drainage. The level nature of the land and close texture of the soil makes surface drainage here impracticable. The next best thing to consider is underground tile drainage. Tile drainage, notwithstanding its high initial cost, will pay in greatly increased production. It is well known that tile-drained lands actually hold more water in suspension in the soil than undrained land, while at the same time keeping the soil in better physical condition. By tile draining, too, aeration of the soil is promoted appreciably.

### Sugar Levies.

Regulations have been approved under the Primary Producers' Organisation and Marketing Acts providing for the making by the Inkerman and South Johnstone Central Sugar Mill Suppliers' Committees of levies on cane supplied to their respective mills during the season commencing 1st May, 1928, and ending on 28th February, 1929, such levies to be at the rate of 1d., in each instance, on every ton of cane supplied. Petitions for polls, signed by not less than 100 growers, in each instance, will be received by the Minister on or before 23rd January next. The amounts derived from the levies, if approved, will be used for defraying expenses incurred by the respective mill suppliers' committees in connection with the recent waterside workers' strike.

### Levies by Mourilyan, Invicta, and Tully River Central Sugar Mill Suppliers' Committees.

Regulations have been approved under the Primary Producers' Organisation and Marketing Acts providing for the Mourilyan, Invicta, and Tully River Central Sugar Mill Suppliers' Committees to make levies on cane supplied to their respective mills during the season commencing 1st May, 1928, and ending on 28th February, 1929, at the rate of ½d. for Mourilyan and Invicta and 1d. for Tully River Central, on every ton of cane supplied. Petitions, signed by not less than eighty growers in each instance, will be received by the Under Secretary, on or before the 9th January, 1929, asking for a poll to be taken on the above levies respectively. The amounts of such levies are to be used for defraying expenses incurred by the respective mill suppliers' committees in connection with the recent waterside workers' strike.

### Broom Millet Board.

Messrs. Hans Niemeyer, of Hatton Vale, Laidley, and Erich Max Schneider, of Binjour Plateau, Gayndah, are the only nominations received for the election of two growers' representatives for the Broom Millet Board. These two gentlemen are the sitting members of the Board, and they, with the Director of Marketing, Mr. L. R. Macgregor, will constitute the new Board for a further twelve months.

A notice was issued in the "Government Gazette" on the 8th of December last advising the intention of the Governor in Council to extend the operations of the Broom Millet Board until the 31st October, 1931. At the same time attention was drawn to the fact that a petition might be sent in up to the 9th of January, 1929, asking that a referendum be conducted to decide whether or not the Broom Millet Board should be so extended.

No such petition has been received, and consequently the Broom Millet Board will now remain in existence until the 31st October, 1931.

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

**Flag Smut of Wheat.**

A Proclamation has been issued declaring Flag Smut (*Urocystis tritici* Keern) to be a disease within the meaning of the Diseases in Plants Acts, and Regulations approved under those Acts provide that the occupier or owner of any land on which wheat plants are growing that are infested with or affected by Flag Smut, shall burn all stubble of such wheat plants immediately after harvesting. The penalty for a breach is £5 for the first offence, and not exceeding £20 for a second or subsequent offence.

**The Pumpkin Beetle.**

The Minister for Agriculture and Stock (Mr. Forgan Smith) commented recently on the fact that the pumpkin beetle is at present abnormally abundant in several districts in South-Eastern Queensland. This pest is capable of inflicting severe losses on pumpkins, rockmelons, watermelons, cucumbers, and vegetable marrows. The beetle is a distinctly marked little insect of an orange-yellow colour with two very conspicuous black blotches on each wing-cover. It measures about one-quarter of an inch in length, and feeds on both the foliage and flowers of attacked plants.

With respect to the control of this pest, the Chief Entomologist (Mr. Veitch) advises that a very considerable measure of success may be obtained by spraying or dusting with arsenate of lead. The spray should be used at the rate of 1 lb. of the powder form of arsenate of lead to 25 gallons of water, and should be thoroughly applied to both sides of the leaves. If the poison is applied as a dust hydrated lime should be employed as the carrier, using 1 lb. of the powder form of arsenate of lead to 4 or 5 lb. of the hydrated lime. The dust is best applied in the early morning, and for its application a hand dusting machine is thoroughly satisfactory. If a dusting machine is not available, the dust can be placed in a cheese cloth bag and then dusted on to the plants by shaking it over them.

Young plants may be protected from attack if the seedlings are covered with some form of netting or hessian which has been stretched over a suitable framework to prevent the beetles gaining access to the seedlings. Such a protective measure, however, is practicable only on a small scale. It will, nevertheless, tide the seedlings over a very dangerous period when the attack of a few beetles may very seriously injure or even kill the infested plants.

A further control measure that has been suggested by some investigators is to liberally dust the plants with wood ashes or lime. This procedure is said to act as a satisfactory repellent in outbreaks of ordinary severity.

**Proposed Banana Board.**

Notice has been issued of intention to constitute a Banana Board under the Primary Producers' Organisation and Marketing Acts, such Board to deal with all bananas produced in Queensland for sale, for a period of three years as from the date of the Order constituting the Board. The Board to deal with the commodity will consist of five elected representatives of growers and the Director of Marketing. For the purpose of election of growers' representatives, the State has been divided into five Districts as follows, each district to elect one representative:—

District No. 1—That part of the State north of and including St. Lawrence;

District No. 2—Areas served by the railway stations on the North Coast Line and Branches south of St. Lawrence to and including Theebine;

District No. 3—Areas served by railway stations on the North Coast Line and Branches south of Theebine to and including Monkland;

District No. 4—Areas served by the railway stations on the North Coast Line and Branches south of Monkland to and including Nambour;

District No. 5—Areas served by the railway stations on the North Coast Line and Branches, Main Line and Branches, South Coast Line, and Suburban Lines south of Nambour to the New South Wales border, including the Bay islands.

Upon the making of the proposed Order in Council, all the commodity (bananas) shall be divested from the growers and become vested in and be the property of the Board. Persons deemed to be growers and eligible to vote on any referendum or election in connection with the said Board prior to the making of the proposed Order shall be all persons who, at any time since the 1st January, 1928, have had for sale, bananas growing within any part of the State of Queensland; growers eligible to vote on any referendum or election held after the proposed Order has been made shall be all persons who, at any time during the twelve months preceding the date of such poll, harvested for sale bananas produced within any part of the State of Queensland.

### Proposed Honey Board.

Notice has been issued under the Primary Producers' Organisation and Marketing Acts of intention to constitute a Honey Board to deal with honey and beeswax produced in Queensland by persons owning not less than five hives of bees in movable frames, such Board to be operative for a period of five years. The Board will consist of four representatives of growers and the Director of Marketing, and will be elected annually.

Persons eligible to vote on any referendum or election in connection with the proposed Board shall be persons who own, within a period of twelve months prior to the date of such election or referendum, at least five hives of bees in movable frames and market the honey and beeswax therefrom. Any petition for a poll to decide whether the proposed Board shall be constituted must be signed by forty growers as above and must reach the Minister before 13th February, 1929, and growers are invited to send their names and addresses at once to the Under Secretary, Department of Agriculture and Stock.

### Egg Board.

An Order in Council has been approved, amending a previous Order in Council, constituting the Egg Board. The amending Order provides that the election of the Board shall be held in December or at such other time decided by the Minister. The original Order provided for the election to be held in December.

### Primary Producers' Co-operative Association.

Regulation 37 under the Primary Producers' Co-operative Associations Acts has been amended to provide that auditors employed by an Association shall retire in each year and shall be eligible for re-election subject to the approval of the Auditor-General. An additional Regulation No. 59 provides that a firm of public accountants may be eligible to be appointed as auditors of an association in the firm name where all partners of the firm hold licenses under the Regulations, and may sign balance-sheets and reports in the firm name.

### State Wheat Board Election.

The result of the election for a growers' representative to fill the vacancy caused by the resignation of Mr. W. J. T. Neale, Allora, for the No. 4 Wheat Board District, was:—

| | Votes. |
|---|---|
| James Theodore Tod (Goomburra) | 247 |
| Heinrich Wilhelm Hinrichsen (Newholm, Clifton) | 78 |
| Charles George Shooter (Ellinthorp) | 64 |
| Edwin Sylvester Maher (Allora) | 41 |
| Philip Henry Imhoff (Upper Forest Springs, via Clifton) | 40 |
| Edward James Doyle (Allora) | 11 |

Mr. Tod will accordingly fill the position lately held by Mr. Neale.

### A Disturbed Balance.

The problem is to increase the production of primary products, and while in an ideal state we should have a town population fully employed in handling the primary produce and in supplying the many needs of the primary producers and of one another, our conditions are such that we have to import many articles that are manufactured in other countries. If we look squarely at the facts we have to interpret the presence of unemployed in our cities as evidence that the balance of town and country populations has been gravely disturbed in the wrong direction, temporarily at least. The academic economist has an easy way out of such a difficulty. All he has to do is to export—theoretically, of course—the surplus labour, and the balance is restored.—"Lyttleton Times" (N.Z.).

### Mere Book Knowledge not Education.

"The aim of education," said Mr. Ramsay MacDonald in a recent speech, "is not fulfilled when you simply make pupils well-stocked reference files. Knowledge is not education. You can know as much as the wisest man in the world ever knew—unless his wisdom consisted of the affairs of the soul, I except that—but so far as his book knowledge is concerned, material knowledge and the knowledge of things, a man may know all that there is to be known and in the end be a consummate fool. The aim of education is not merely the acquiring of knowledge. It is far more akin to this—the capacity to use what you do know, and the man who can use a little of his knowledge is a far better-educated man than the man who knows a great deal and cannot use anything at all of it."

**The City-ward Drift.**

Growth of cities implies the development of that "home market" which, because it is close at hand and constant, is, as Adam Smith shows, the best of all markets in proportion to its size. And if the farmer has occasion to complain of the scarcity of agricultural labour, he should remember that this is partly due to the displacement of manual processes by machinery, which, even in the primary industries, has deprived large numbers of rural workers of employment and driven them to the towns for refuge. If we add to these the surplus immigrants who through a mistaken policy have been attracted to the country before any adequate provision has been made for them, and who have therefore never been able to "get on the land," we have gone some way towards explaining the "urban drift."—Auckland "Star" (N.Z.).

**Production and Marketing.**

In Great Britain, probably, we have tended in the past to think too much of production and not enough of marketing. Even now there are recurrent complaints that British manufacturers are inadequately informed on the special requirements of foreign buyers. Probably, too, we have given insufficient thought to the selection and training of salesmen for their particular work. The kind of training required by a British salesman, indeed, must be considered a training not so much in verbal dexterity as in the intelligent understanding of the goods in which he deals. A traveller in textile goods, for example, should be able to answer almost any technical question that can be put to him by a buyer, without need to refer to the factory for information. In all industries there is ample scope for technical training of this kind, and the higher the character of British goods the higher will be the character of the salesmanship required to do them justice.—"Yorkshire Post."

**Are We Over Organised?**

"We are overdone with reformers and organisers, and underdone with people of sufficient balance and judgment to realise the complexities of the problem and the difficulties inherent in it. We have suffered a great deal from the dangers of action founded on misunderstanding. There is never any doubt as to what is the right course for the individual. There is always grave doubt on the same question for groups of individuals, or for society as a whole. If that be true, wisdom would seem to lie in a lack of action except by individuals. That, I think, will be the tendency of the next generation or two. We have had far too much collective action and far too little encouragement for the individual. Such difficulties as beset us may be traced to these tendencies, and the hope of the future lies in a reversion of them."—Sir Ernest Benn, writing in "Producer and Consumer."

**Brains in Industry.**

"Just as the modern employer—who really to-day is not an individual or a board of directors but thousands of shareholders—has advanced in wisdom and vision beyond the old-time 'masters,' so the workers, with the great spread of elementary, secondary, and university education, are also more fitted to realise the dignity and the responsibilities of their place in industry as well as the vast potentialities of modern science and industry as a whole. A new craftsmanship of the brain has arisen to replace the old craftsmanship of the hand. These new craftsmen in whose care is placed the control and operation of great machines will not lightly throw their livelihood, their future, their firm, and their industry into the melting pot of strife and dissension. The clouds of industrial turmoil are clearing and the future is bright with the hopes of real progress towards a common understanding. That understanding will come from a quality which has never yet failed the British nation, and that is the intelligence and sound common sense of the vast majority of its people."—Lord Melchett in the "Manchester Evening News."

**Service Before Self—and Pelf.**

"No employee could do his best in a dehumanised concern. The worst wage-slave was not the poorest-paid worker, but the person, whether in a well-paid station or a lowly one, who worked merely for money. Ideal conditions could be arrived at only by great effort and by sympathetic understanding or understanding sympathy. They were conscious of their high calling, rendering a useful service by clothing and furnishing their fellows, and it followed that they could take no mean advantage, but should help to make business a great, thrilling experience, and not a treadmill with breaks for sleep. With right ideas, all would radiate happiness on their way to work, and enjoy an honourable weariness when they left it.—Mr. W. B. Veysey, chairman of John Dyer, Ltd., a successful British business enterprise.

### The Kelpie—Its Origin.

What is the origin of the kelpe sheep dog? Is it an American product or is it related in some way to the Australian dingo?

Although recognised as a good sheep dog, very little appears to be known of the kelpie. One writer declares that it is a new type of dog that originated in America, but this writer failed to show its origin.

Writing on this subject, Mr. J. Hogan, of Bungonia (N.S.W.), states that the kelpie in reality is an Australian dog, the place of its origin being Queensland. In the first place it was a cross between the Queensland native dog and a smooth-haired terrier (probably a Border Collie). This was the starting point, but the first cross, naturally, was a mongrel and good for nothing. The next cross produced a different class of dog with the strain of the dingo, and gradually developed into the sheep dog. It bears a great resemblance to the dingo in its habits, but not in its body. Its colour generally is black with smooth hair, whereas the dingo is brown. The true kelpie is black and tan, with pricked ears. Like the dingo, it is very cunning, and although a good worker among sheep it loses its temper while at work and will snap or bite the sheep, and a muzzle has then to be used to break the dog of this habit. The kelpie requires careful watching, as in many instances it has been found that after two or three years' work among sheep it turns to killing—a vice inherited from the dingo. The kelpie has numerous friends among sheepmen, many of whom declare that it has not the vices that suggest its origin from the dingo.

### Moving to Better Things.

The world has been moving to something better. It is always a better world than it was. Light comes into dark places, the crooked ways are made straight, the evil passes away. We must not be deceived because bad things are fighting hard for their life. The strongholds of evil do not fall like the walls of Jericho, at a sound of the trumpet or a mightly shout; they are brought down by some strange power that runs through all things, and is kept alive by all who believe. It is the faith that moves mountains which rules the world from age to age. Truth has been often on the scaffold. Wrong has been often on the throne. In the end the love of right and truth and justice and freedom and mercy has never been beaten in the world. The love of these things has broken the might of kings and shattered their empires to pieces.—Mr. Arthur Mee, the editor of the "Children's Newspaper," in its 500th number.

### Go Back to Adam Smith.

"It is not fashionable for a man in trade to-day to inquire how he can increase his output. His thoughts are concentrated on the problem of limiting his market and maintaining his prices. Rubber, cotton, sugar, and many other commodities cry aloud of the folly of the method. It seems to me that here is work for our schools of economics. They should be able to make the people understand that they must stand in the market-place to be hired or in the queue to be rationed. We must have competition among producers or else we must go under as consumers; there is no middle course. A producer point of view leads us all the time to be tinkering with some detail or other—coal, ships, buttons, films, or French cherries; from the Prime Minister downwards we never seem to think of the nation as a whole, we are always favouring some one part at the expense of the rest. So I ask, would it not be wise for a time to forget about work and wages and prices and foreigners and empires, and all the rest of the popular political stock-in-trade, and go back to Adam Smith and his 'plentiful subsistence for the people'?"—Sir Ernest Benn, in the "Cambridge Review."

### Swat that Fly.

With modern architecture, modern drainage, modern drying and heating and cooling and cleansing systems we can all be quite healthy if we do what prudence requires. But we cannot, unless by accident, remain healthy if we are careless and unclean. Flies, alone, as Dr. Lester reminded us recently, threaten us every hour of the day right through the summer, and although we all know this, or should, very few of us make a really sustained and intelligent effort to destroy flies whenever and wherever they appear. It is also the case that the methods by which rubbish is removed and destroyed in all New Zealand towns are "lamentably primitive and inefficient." Although we may have to put up with these methods a little longer, we should make it clear that we do not approve of them, and in the meantime bestir ourselves as individuals to nullify their evil effects.—Christchurch (N.Z.) "Press."

### The Simple Things of Life

"My formula for a book to simplicity itself—an outdoor setting of land in which I have lived until, as Mary Austin expresses it, I know 'the procession of the year.' Then I people the location with the men and women who live there, and on my pages write down their story of joy and sorrow commingled as living among them I know it to be. This is the secret of any appeal that my work may make. And I want to say for such people as I put into books, that in the plain, old-fashioned country homes where I have lived, I have known such wealth of loving consideration, such fidelity between husband and wife, such obedience in children, such constancy to purpose, such whole-souled love for friends and neighbours, such absence of jealousy, pettiness and rivalry, as my city critics do not know is in existence. I never could write a historical novel, because I want my history embellished with anything on earth save fiction. I never could write of society, because I know just enough about it to know that the more I know, the less I wish to know. I have read a few 'problem' novels, and they appeal to me as a wandering over nasty, lawless subjects and situations of the most ancient type, under new names. There is nothing remaining for me but the woods, and the people I meet there. For every bad man and woman I ever have known I have met, lived with and intimately known an overwhelming number of strictly clean, decent people, and upon the lives of these I base what I write."—Gene Stratton Porter.

### Courage in Excelsis.

"Visiting the wards of our hospital, for there perhaps as nowhere else we see courage in its purest form. The slings and arrows of what may appear to them an outrageous fortune are faced with a smile and with the head erect; there is no crouching as in despair, I leave those walls filled with a great wonder, humbled with a great humility, proud that in this world there are men and women and children with a courage edged so fine. We who practice the science and the art of medicine are sometimes said to work very close to those shadows which are cast upon the world by the turrets of oblivion. The shadows are suffering and disease, demands of Moloch which never seem to be satisfied, reminders perhaps that here we have no abiding city. And of those shadows surely the deepest is that of the disease or accident which, once encountered, either saps the vital spark from day to day or (and to some it seems the harder fate) leaves the poor sufferer living but crippled and, it may be, helpless. Some of these cases are among the real tragedies of human life, and so often they come to those least able, it would seem, to bear them."—Professor John Fraser, M.C., M.D.

### Land as an Investment.

As an avenue for investment, land has fallen into neglect. The explanation notoriously consists in the inflation of values of land, and it may be doubted whether even yet, despite the efforts of the past few years to restore broad acres to their economic value, actual stability has been reached. The conditions, however, that affect the rural industries are distinctly promising. An exceptional production of dairy produce is anticipated this year; the wool sales so far in the present series yielded satisfactory prices and the extent of the clips that are to be offered is expected to be higher than last year; and the meat export season has been a favourable one. These circumstances should certainly increase the attractiveness of land as a security for investment, while the inevitable effect of the steady accumulation of money that has been going on must be an easing of the price of money.—"Otago (N.Z.) Daily Times."

### Milk and Thunderstorms.

According to "Chem. Weekblad," a Dutch milk supplying company has made some investigations on the subject of the influence of thunderstorms on the development of acid in milk in a hope of being able to throw some light on superstitious tales of milk suddenly turning sour during electrical storms. It was investigated whether milk would turn sour more quickly if exposed to an electrified atmosphere than if kept out of it, and it was shown that neither the effect of alternate current, nor that of constant current of equal tension, as observed during thunderstorms, would have any influence on the quantity of acid in the milk, although exposed for fifteen hours. The opinion is, therefore, expressed, that electrical power, whether of atmospheric origin or otherwise, has no noticeable influence whatever on the rate at which the spontaneous acidification of milk takes place. It is thought that the real cause of milk turning sour during a thunderstorm is found in the higher atmospheric temperature generally prevailing previous to such storms.

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### ARTIFICIAL FEEDING.

To be successfully achieved, this is a matter which entails for the mother or nurse much work and never-failing attention to details.

With a healthy mother and child it should never be recommended, much less advocated as being superior to natural feeding. Indeed, the bottle-fed baby should be regarded as an unfortunate infant who, through very definite misfortune, has been deprived of that great birthright—his mother's milk. The death rate among artificially fed babies is, and always will be, higher than among those who are breast fed. Statistics tell us that of the babies who die in their first year many more are artificially fed than breast fed. This is a fact which should be known to, and well considered by, every woman who contemplates weaning a baby from his mother's milk and giving him a bottle.

Unfortunately, in some cases, owing to the death or prolonged illness of the mother, artificial feeding cannot be avoided. In such cases those in charge of the child should see to it that they obtain reliable information as regards his feeding. A brief illness—e.g., influenza—should never be regarded as an indication for weaning. Babies have frequently been fed by their mothers through attacks of influenza without any ill effects resulting. When the mother is too ill to nurse the child, the milk supply should be kept up by regularly and daily expressing the milk from the breasts.

Remember that the younger the child is when taken off the mother's milk and put on artificial food the greater are the risks attending the change. Up to weaning age—i.e., about nine months—before deciding to take a child off his mother's milk and bottle feed him, always make quite sure that the weaning is necessary. With a healthy mother and normal baby this is very rarely the case. Over 90 per cent. of women are able to feed their infants, if not wholly, at least partly.

Many mothers are inclined to think that their milk is not agreeing with baby, when what is really at fault is not their milk but their method of feeding. Sometimes baby gets wind or colic, or cries a good deal after he has been fed. Sometimes he sleeps badly at night. But all these conditions can be, and frequently are, due to faulty feeding—perhaps irregular feeding or overfeeding and not to any defect in the mother's milk. Sometimes the mother thinks that her milk looks too thin and watery, and that such a poor-looking fluid cannot contain enough nourishment for baby. But many analyses have proved that this watery-looking milk is just as rich and contains as much nourishment as the richer looking specimens. In some cases the mother is tempted to wean her baby because she sees glowing advertisements with pictures of large fat babies who have been fed on some artificial food, and she decides that she will give her baby the food which achieved such wonderful results. Babies fed on patent foods are frequently very fat, and very heavy, but there are no advantages, and several definite disadvantages in this excess of weight. The overweight baby is too heavy for his mother to carry about comfortably, especially in hot weather, consequently he may not be taken out for his necessary daily walk, as he could be if he weighed less. On account of his weight he does not learn to sit up, crawl, or walk as early as the child of normal weight, so is more helpless, requires more attention, and has to be carried about longer by his mother. Then, when he does walk, there is risk that his soft, growing bones may not be able to support his weight, and he may become bandy. So let every mother realise that, in spite of glowing advertisements, no artificial food is as good for her baby as his own mother's milk. Further, if baby has not been thriving on his natural food, he is likely to do much worse when given an artificial food.

No mother should wean her baby because she discovers that she has not quite enough food for him. She should give what there is and make up to the necessary amount with a little artificial food, given after—never before—the breast feed. In

such cases condensed milk must not be given to complete the feeding. It is very sweet, much sweeter than mother's milk; baby likes sweet things, and in a very short time he will show his preference by refusing to take his mother's milk. So the food which completes the feeding must be only slightly sweet. For such cases sugar of milk, which is only faintly sweet, should be used instead of cane sugar. Many people think that mother's milk and an artificial food cannot be given together, but this is a mistake. They can be given together; in fact, the mother's milk helps baby to digest the artificial food, and the child who is getting even a little of his mother's milk with the artificial food will thrive better than the one who is getting artificial food only.

## IMPORTANT POINTS TO REMEMBER.

In cases where artificial food is absolutely unavoidable special attention must be paid to the following three points:—

Cleanliness; the food given; and the baby's ability to digest that special food. Notice that cleanliness is put first. A moment's thought will tell you that the best artificial food, given in an uncleanly way, could be a source of serious risk to the baby. This need for absolute cleanliness makes artificial feeding a matter entailing a great deal of work. The food and all utensils must be constantly guarded. If fresh milk is used the source of the supply must be inquired into to ensure that it is satisfactory. In the home it must be protected from dirt and contamination. Bottles, teats, and all other utensils used—and there are a good many—must receive care and attention before and after each feeding.

The upright feeding bottle is a good type to use; the rounded inner surface is easily cleaned, and there is no unnecessary valve. Also, its shape permits of the contents being easily warmed, when necessary, simply by standing it in a basin of hot water. Failing this, the boat-shaped bottle is best. The hole in the teat should be small enough to prevent the food from dripping into the child's mouth. It is of the right size when baby, sucking vigorously, takes his feed in about twenty minutes. A fact that mothers sometimes forget is that the hole in the teat quickly enlarges, and one that is the right size to-day may in two or three days be too large, and permit of baby getting his food much too quickly. So watch must be kept and the teat renewed when necessary.

The Food.—Milk is the only food for babies. When good fresh cow's milk is available, this is better than dried or preserved milk. The milk should be scalded as soon as possible. Raw milk is dangerous unless it is very fresh, very clean, and comes from cows free from tuberculosis. Boiled milk is easier to digest than raw milk, and so long as the baby is given a little orange juice daily after it is three months' old there is no disadvantage in using boiled milk. The simplest method is to put the milk in a small saucepan and take it off the stove as soon as it begins to boil. If pasteurised milk, delivered in sealed bottles, is being used it should not be boiled unless it has to be kept more than twelve hours. After that it should be boiled.

It is impossible to give a diet scale which will suit every baby, but it may be well to have some guide for feeding a suddenly weaned infant in an emergency, and until special instructions can be obtained from a doctor or welfare nurse. For a baby under six months commence with one part cow's milk to two parts water, and increase gradually until equal parts milk and water are being given. For a baby over six months commence with equal parts milk and water, and increase until two parts milk and one of water are being given. To each half-pint of the mixture add one level household tablespoonful of sugar. Dried milks can be useful when fresh milk is not obtainable, when the source of the milk supply is not satisfactory, in hot weather when milk will not keep, or when travelling. The full strength recommended on the tins should never be given at first, but about half this, and gradually increased. Healthy babies often thrive very well on these dried milks, but very young or delicate babies may be unable to digest them sufficiently.

Household tablespoons, which vary greatly in size, are not reliable for measuring baby's food; if one must be used, select a small one, but it is better to have accurate measures. The markings on the feeding bottles are usually correct.

The third point which must receive special attention is the child's ability to deal with any special food. It is a well-known fact that a food which will agree with one baby, and on which it will grow and thrive, may disagree with another, and even make it very ill. A baby's ability to tolerate a food can only be judged by giving it. This serves to emphasise the fact that babies should have, whenever possible, their mother's milk, which does agree with them. As regards regularity, time of feeding, &c., the artificially fed baby is treated in the same way as the naturally fed infant. If fed three-hourly, feed at 6 and 9 a.m., 12 midday and 3, 6 and 10 p.m. If four-hourly fed, and most normal babies are better fed so, feed at 6 and 10 a.m. and 2, 6, and 10 p.m. Give no night feeds from birth; make no exceptions to this rule.

## THE CARE OF THE BABY.

Far more babies die during the hot months than during the cool season. Let no one blame the Queensland climate for this. Babies thrive and keep healthy in hot weather when proper care is taken. With a little knowledge of infant management all our unnecessary summer mortality might be prevented. During hot weather the baby should not be overclothed. He should have plenty of fresh air day and night, but should be shaded from the direct rays of the sun when he is out of doors, as he ought to be every day. During hot weather he is more thirsty and should be given a drink of water whenever he wants it. As he uses very little body fuel to keep up his body temperature, he needs rather less food, and is not so hungry as in cold weather. Any excess of food is more likely to upset him, and if the hot weather comes suddenly it is wise to cut down the quantity or strength of his food slightly, but he should have as much as he needs. Food that agreed with him before may upset him now, and advances in diet should be made cautiously. It is wise to wean babies in the cool months rather than in the hot months, though this is not always possible.

Every summer we have outbreaks of dysentery amongst our babies; no years are free from them. Dysentery is an entirely preventable disease. It is characterised by loose motions, containing blood and slime, often passed with much straining. There is rapid wasting and there may be high fever and great prostration. In many cases death ensues. It is sometimes called gastro-enteritis or summer diarrhœa, but its right name is dysentery. It is caused by dysentery bacilli, which are contained in the motions passed. Dysentery bacilli during epidemics are found also in the motions of many people who are only slightly indisposed or perhaps not ill at all. They may be conveyed by the mother's hands from the baby's napkins to the food of other children. From one house to another they are conveyed by flies which visit the closet-pans and infect the babies' food or the teats of their bottles or their dummies. Dysentery epidemics occur during the fly season.

The best preventive of dysentery is breast feeding. Flies cannot convey dysentery to the food of a breast-fed baby, but they are very fond of settling on the baby's dummy. The present fashion of using dummies and pinning them outside babies' frocks is a direct invitation to disease. It is exposing healthy babies to a serious risk of death. If a mother wishes to keep her baby safe from this dread disease she will put its dummy, if it has one, into the kitchen fire. If the baby is bottle-fed, she will take the utmost care to protect its food, its bottles, and teats, after scalding them, from flies. The lives of Queensland babies depend on the care taken by Queensland mothers. Are we to have any unnecessary babies' deaths this year? —Dr. A. Turner, Director of Infant Welfare.

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## RAISING SEEDLINGS.

The soil for the seed-bed or seed-box is prepared by mixing good garden loam with sand. Such a soil holds moisture well, allows the young plants every opportunity of pushing their way to the surface, and encourages a large root development. Too rich a soil in the seed-bed or seed-box has a tendency to produce long, spindly plants, while if the soil sets hard it is quite unsuitable for its purpose, and where the garden loam used in the mixture gives it such an inclination more sand should be used.

The seed-box need not be more than 4 to 6 inches deep. It is important that drainage be allowed for, and although the chances of successful seed-raising are very remote without good drainage, the provision is one which beginners often neglect to make. Unless the bottom boards of the box are divided by a well-defined space, it will be necessary either to replace them by narrower ones or to bore holes in them with an auger, so that the water may have an easy get-away. Small openings between the bottom boards are of little use, as the swelling of the timber after watering may make the box practically watertight. The bottom of the seed-box should be spread with a layer of pieces of broken pots or small stones. Over this should be placed (if available) a layer of leaf mould, and finally the sandy loam mixture in which the seed is to be sown. The surface should be pressed down with a piece of board before sowings are made.

To sow small seeds, whether in boxes or in the garden bed, make very shallow drills—just slight depressions—across the surface of the soil and sprinkle the seed evenly along them. For light seeding the seed should be picked up between the finger and thumb and dropped with a slow rubbing movement. After sowing, shake a little prepared soil over the surface and again press down lightly with a block of wood.

The watering of the seed-box or seed-bed must at all times be carried out with care, so that the flattening of the plants and the washing of the soil from their roots may be prevented. The boxes should be on a level, so that the effects of watering may be uniform. Unless the rose of the watering-can is an extremely fine one, it is preferable to immerse the boxes in water in a suitable receptacle in which the water is deep enough to percolate upwards to the surface of the soil, but not so deep that water will lie actually on the surface of the soil. If the original seeding has been too thick the young plants should be thinned out or pricked off into other boxes. Pricking out into a second set of boxes or a seed-bed has the effect of producing well-rooted, stocky plants which can be transplanted ultimately into the open with the least risk of failure. The young seedlings should not be pricked out until they have thrown out their third leaf.

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## THE BEAUTIES OF NATURE.

The man whose mind is so "artifical" that he can see no wonder and beauty in a growing shoot or budding flower, and who cannot appreciate the charm and inspiration of a blossoming peach tree, or imbibe peace and calm from a soft emerald lawn, or glorious scented roses, is to be pitied—and mistrusted, since he is probably lacking in other vital human qualities. We need not all be philosophers or poets; but the beauties of Nature should stir the emotions and make us, like Wordsworth, unconsciously richer in mind—

"I saw a crowd,
A host of golden daffodils. . . . .
I gazed—and gazed—but little thought
What wealth the show to me had brought:
For oft, when on my couch I lie
In vacant or in pensive mood,
They flash upon that inward eye
Which is the bliss of solitude;
And then my heart with pleasure fills,
And dances with the daffodils."

Moreover, in the lives of even the happiest and most carefree among us there are moments of depression and disillusion, when we crave solitude, and when the comforting words of a well-meaning friend would only serve to irritate and accentuate our gloominess and "blue" feeling.

At such times there is nothing more soothing and consoling than a garden, wherein we may potter about and forget our woes—

"Flowers are so exquisite and so silent."

Gardening, therefore, as a hobby is unequalled for "taking us out of ourselves." A garden requires constant attention—watering, weeding, digging, and sowing—and leaves us little time for moroseness or self-pitying introspection. As the writer, Richard King, has so aptly said—

> "Gardening is the only hobby wherein a man is sufficient unto himself alone. Most other hobbies drag in at least one other person, either as critic, partner, or echo. But a man with a garden needs only faith and a seed catalogue."

The nature-lover is indeed never lonely. But to be a nature-lover does not imply knowing by rote the long scientific names of every weed and tree and plant or being able to judge with botanical accuracy the quantity of nitrogen which the roots of leguminous plants impart to the soil, and suchlike facts. It is well to know these, but not at the expense of simple delight and happiness. One need not become enthusiastic to the point of intellectual automatism! One can, without being able to name a single flower or bird or tree, be more sincerely a lover of Nature than the walking-guide-book-to-horticulture.

The true test is whether our spirit is gladdened by, and rejoices at, the simplicity of Nature. And what better way of appreciating this than by cultivating one's own garden patch? As someone has written, "Gardening must be God's hobby. It is the only human recreation with a 'soul' in it."—"Orchis" in the "South African Gardening and Country Life."

## THE PLANTING AND CARE OF HEDGES.

When properly planted and kept in good order, a hedge is a great shelter and a lasting ornament to any place, and will add considerably to the value of a property.

It is advisable in this State to plant hedges on level ground, on account of the long spells of dry weather and the hot winds which prevail during the summer. Where the ground is swampy, however, it is necessary to form a bank or what is generally called a turf wall, two or three feet above the ground level, tapering on both sides, and about two feet broad on top. A line is run along the centre of the bank, and a little trench cut out, and the rooted cuttings are planted against the back of the trench, where the line is set. Where the turf has been removed to form the bank will now act as a drain.

The trench should be about 18 inches wide and a good spade deep. Some manure should be put in the bottom, and covered with a light layer of soil, and the plants placed up against the straight solid wall. The roots are covered with a little soil and well watered, and the trench filled up with the remainder of the soil. When this is done it is advisable to look along the row of plants to see if any are out of place. When the plants are made firm, cut them each to six or eight inches from the ground, and dig the ground for about three feet on each side of the hedge.

Hedges that are exposed to cattle must be fenced as soon as planted, either with a temporary stake and bush hedge, with hurdles, or with a light post and wire fence, for four or five years, till the hedge grows up, care being taken not to place the fence too close to the hedge. The hedge must also be duly weeded while young, especially during the first two years.

In order to preserve hedges in proper form, they must be clipped on the sides and tops at least once a year, and, if possible, oftener. The best time for the first cut is midsummer, with the second cut in April or May. The shoots should always be cut the same season while in leaf, and before they become hard. The work may thus be performed more expeditiously and with greater exactness, as the cutting should be as even as a wall on the sides, and the top as straight as a line. After the hedge is formed to its proper width, the growth should be cut as nearly as possible to that of the former cut, particularly on the sides. It should never be allowed to grow more than a foot or 18 inches wide, or too much on the top.

When the cutting cannot be carried out more than once in the year, the clipping should not be performed until the end of April or May in this State, for if cut sooner it will shoot again, and appear almost as rough all the winter as if it had not been touched.

High hedges are very troublesome and expensive to keep in proper order.

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## BUDDING FRUIT TREES—NO TIME LIKE THE PRESENT.

The present month is likely to be most suitable for budding both old trees and nursery stock. Old trees which were cut back at the end of the winter with a view to being worked in the summer should by this time have made quite sufficient mature young shoots to bud into. It is by far the best policy to work many more of these young shoots than will be required for the ultimate formation of the new tree, as there is likely to be some loss from heavy winds and other causes. Moreover, the leaf surface of the tree is very much reduced by the cutting back in the winter, and it is to the benefit of the tree to allow as much new foliage to grow as possible. The development of shoots from several points round thick stumps keeps the bark healthy all round, whereas if only a few shoots spring from one side the bark often dies away on the other side. The thinning out of superfluous shoots can be spread over several years.

There are three seasons—spring, summer, and autumn—when budding can be carried out, but autumn finds most favour with nurserymen for budding citrus trees. The operation is best carried out on fine days, avoiding wet days.

Insert the buds in the young stock about 4 to 6 inches above the ground, but when old trees are being worked over the buds may be inserted in the branches close to the trunk of the tree, and just where a limb is required. This will give the tree a good shape. It is generally found best to put the bud on the under side rather than on the top side of the limb, as, by inserting the bud on the top

of the limb in an old tree, the growth tends to be all inwards, thus unduly crowding the centre of the tree.

Medium-sized shoots afford the best buds, and well-developed buds are the best to use. The buds towards the top of a shoot are not usually well-developed, and those near the base are, as a rule, also small and poorly developed; and, while they might grow all right, the chances are they will not make such fruitful trees as those grown from buds which are large and well-matured, and which have clustered around them two or more fruit buds. This applies more particularly to peaches, apricots, nectarines, and plums.

As soon as the bud stick is cut from the tree, the leaves should be cut off just close to the bud, and the quicker the latter is inserted the better. This, together with tight wrapping, is the reason why men accustomed to the work have better success than amateurs, as they never mutilate a bud when cutting it, and from the time it is cut until it is inserted is only a matter of a few seconds. It is a good idea to carry the bud stick wrapped in wet sacking during hot weather to keep it from wilting and spoiling.

To make the cut in the stock, preparatory to inserting the bud, take a *sharp* budding knife and make a vertical cut from 1 to 1½ inches in length, then a horizontal cut directly across the top of the first cut, allowing the knife to press back, so that the bark is cut and slightly raised with the one operation. If the sap is flowing freely these two cuts extending through the bark are all that is required. As the bud will have to be slipped downwards into this cut, we must cut the bud from the bud stick by commencing the cut below the bud and finishing above it. This leaves the bottom portion of the bud in a very smooth condition, and allows it to keep its shape while being forced underneath the bark of the stock. It will be observed that the bark has not been loosened, except when making the horizontal cut, and then only sufficiently to allow the lower point of the bud to enter the bark, preparatory to being forced down with either knife or thumb.

To cut the bud from the bud stick, insert the knife half an inch below the bud, cutting through the bark into the wood, pass the knife under the bud and bring it out half an inch above it, thus severing the bud with a thin slice of wood adhering to it. The bud is now placed in the top of the cut made on the stock and forced down with the thumb or the blade of the budding knife. The bud is now ready to be tied, and if raffia is used it should be moistened before being used.

Care must be taken to see that the bud is tightly wrapped and securely fastened, for if the wrapping becomes loose the chances are the bud will not take. The bud will not be damaged even if it is completely covered by the wrapping, but if it is large it is as well to leave it slightly exposed. If there is any reason to expect rain about budding time, it is best to use a waxed cloth, and by starting the wrap from below the bud and finishing at the top it can be so wrapped that very little moisture will find its way underneath the waxed cloth.

## CAPE GOOSEBERRIES.

When making the tomato bed and sowing seed, sow also the cape gooseberry. The cape gooseberry is a member of the same family group as the tomato, and the treatment that suits one suits the other. The plants like a fairly light soil, which has been well manured with either thoroughly rotted cow manure or well treated with meatworks manure and superphosphate. When the young plants are put in they should be well firmed into the ground, and given a good watering. It may be desirable, for a day or two, to give them a little shade. One who has had great success with the cape gooseberry recommends the following treatment:—"Although the cape gooseberry is a perennial, I find that it does best with us in Queensland when treated as an annual. It fruits very heavily in its first season, and I think far more heavily than in subsequent seasons. I like to sow the seed in large pots of fairly rich soil, though the soil must be light. The seed is quite big enough to let me put out each seed separately, and in that way I am able to ensure that the young plants are not crowded together. I sow the seed, water it, and then stretch a piece of white paper right over the pot. I put this pot out in the sun. It is not many days before the seeds show signs of breaking through the soil. I then remove the paper covering, and all I have to do is to see that the soil is kept moist. The plants grow very quickly, and as soon as they develop their second pair of leaves I put them out in the beds where they are to grow. I have a neighbour who, being an Englishman, and an old-time gardener, pricks his seedlings out. That is to say, after removing them from the seed pot he puts them into a small pot, and lets them develop in that pot before he transfers them, soil and all, into the bed. I think he probably has better results than I have, but then he has a lot more work."

# Orchard Notes for March.

## THE COASTAL DISTRICTS.

If the weather is favourable, all orchards, plantations, and vineyards should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out, as there is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit, whereas a lot of weedy overcrowded suckers will only give small bunches of undersized fruit that is hard to dispose of, even at a low price.

Cooler weather may tend to improve the carrying qualities of the fruit, but care must still be taken to see that it is not allowed to become over-developed before it is packed, otherwise it may arrive at its destination in an over-ripe and consequently unsaleable condition. The greatest care should be taken in grading and packing fruit. Only one size of fruit of even quality must be packed. Smaller or inferior fruit must never be packed with good large fruit, but must always be packed separately as required by regulation.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of plantations which are apt to become somewhat dirty during the gathering of the crop must be cleaned up. All weeds must be destroyed, and if blady grass has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be well worked and brought into a state of thorough tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green. Citrus fruits of all kinds require the most careful handling, as a bruised fruit is a spoilt fruit, and is very liable to speck or rot. The fungus that causes specking cannot injure any fruit unless the skin is first injured. Fruit with perfect skin will eventually shrivel, but will not speck. Specking or blue mould can therefore be guarded against by the exercise of great care in handling and packing. At the same time, some fruit is always liable to become injured, either by mechanical means, such as thorn pricks, wind action, hail, punctures by sucking insects, fruit flies, the spotted peach moth, or gnawing insects injuring the skin. Any one of these injuries makes it easy for the spores of the fungus to enter the fruit and germinate. All such fruit must therefore be gathered and destroyed, and so minimise the risk of infection. When specked fruit is allowed to lie about in the orchard or to hang on the trees, or when it is left in the packing sheds, it is a constant source of danger, as millions of spores are produced by it. These spores are carried by the wind in every direction, and are ready to establish themselves whenever they come in contact with any fruit into which they can penetrate. Specking is accountable for a large percentage of loss frequently experienced in sending citrus fruits to the Southern States, especially early in the season, and as it can be largely prevented by the exercise of necessary care and attention, growers are urged not to neglect these important measures.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The flat bushel-case (long packer) commonly used for citrus fruits does not lend itself to up-to-date methods of grading and packing, and we have yet to find a better case than the American orange case recommended by the writer when he came to this country from California in 1892, and which has again proved its superiority in the recent shipments of oranges from the Southern States to England. Failing this case, a bushel-case suggested by the New South Wales Department of Agriculture is, in the writer's opinion, the most suitable for citrus fruits, and were it adopted it would be a simple matter to standardise the grades of our citrus fruit, as has been done in respect to apples packed in the standard bushel-case used generally for apples throughout the Commonwealth. The inside measurements of the case suggested are 18 in. long, 11¾ in. wide, and 10½ in. deep. This case has a capacity of 2,200 cubic inches, but is not included in the schedule of the regulations under "*The Fruit Cases Acts*, 1912-1922." The

half-bushel case, No. 6 of the Schedule above referred to, is 10 in. by 11¼ in. by 5¼ in. inside measurements with a capacity of 1,100 cubic inches. The case should be suitable for oranges and the half-case for mandarins. No matter which case is used, the fruit must be sweated for seven days before it is sent to the Southern markets, in order to determine what fruit has been attacked by fruit fly, and also to enable bruised or injured fruit liable to speck to be removed prior to despatch.

Fruit fly must be systematically fought in all orchards, for if this important work is neglected there is always a very great risk of this pest causing serious loss to citrus growers.

The spotted peach moth frequently causes serious loss, especially in the case of navels. It can be treated in a similar manner to the codlin moth of pip fruit, by spraying with arsenate of lead, but an even better remedy is not to grow any corn or other crop that harbours this pest in or near the orchard. Large sucking-moths also damage the ripening fruit. They are easily attracted by very ripe bananas or by a water-melon cut in pieces, and can be caught or destroyed by a flare or torch when feeding on these trap fruits. If this method of destruction is followed up for a few nights, the moth will soon be thinned out.

Strawberry planting can be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be carefully followed. The latter varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been published by the Department, which advice and instruction should enable the growers in that district to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes, and it is pleasing to note that some growers are packing their fruit very well. Those who are not so expert cannot do better than follow the methods of the most successful packers.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of requiring water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening stage, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much water is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light irrigation is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

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# Farm Notes for March.

Land on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that weeds will not make such vigorous growth during the succeeding few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where blight has previously existed, or where there is the slightest possible chance of its appearing, preventive methods should be adopted—i.e., spraying with "Burgundy mixture"—when the plants are a few inches high and have formed the leaves; to be followed by a second, and, if necessary, a third spraying before the flowering stage is reached.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Selected grain which is intended for future seed supplies should be well fumigated for twenty-four hours and subsequently aerated and stored in airtight containers. Weevils are usually very prevalent in the field at this time of the year and do considerable damage to the grain when in the husk.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Packed cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bags, or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *phalaris bulbosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which were too far advanced to benefit by the recent rains, and which show no promise of returning satisfactory yields of grain, would be well advised to convert these into ensilage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of Soudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reached a suitable stage for converting into ensilage, it will be found that this method of conserving them has much to recommend it. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position by means of weighted wires.

*Photo.: Jean Easton.*]

Plate 64.

Shaded Silences.—A Peaceful Pool on Coochin Coochin.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | February. 1929. | | March, 1929. | | MOONRISE. Feb. 1929. | MOONRISE. Mar., 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | p.m. |
| 1 | 5.26 | 6.46 | 5.46 | 6.24 | 11.14 | 9.45 |
| 2 | 5.26 | 6.45 | 5.47 | 6.23 | 11.47 | 10.20 |
| 3 | 5.27 | 6.45 | 5.48 | 6.22 | 0.0 | 11.0 |
| | | | | | a.m. | |
| 4 | 5.28 | 6.44 | 5.48 | 6 21 | 12.23 | 11 46 |
| 5 | 5.28 | 6.44 | 5.49 | 6.20 | 1.5 | 0.0 |
| | | | | | | a.m. |
| 6 | 5.29 | 6.43 | 5.49 | 6.19 | 1.53 | 12.34 |
| 7 | 5.30 | 6.42 | 5.50 | 6.17 | 2.43 | 1.28 |
| 8 | 5.31 | 6.42 | 5.50 | 6.16 | 3.37 | 2.22 |
| 9 | 5.31 | 6.41 | 5.51 | 6.15 | 4.32 | 3.29 |
| 10 | 5.32 | 6.40 | 5 51 | 6.14 | 5.31 | 4 20 |
| 11 | 5.33 | 6.40 | 5.52 | 6.13 | 6.32 | 5.20 |
| 12 | 5.34 | 6.39 | 5 52 | 6.12 | 7.31 | 6.20 |
| 13 | 5.34 | 6.38 | 5.53 | 6.11 | 8.29 | 7.19 |
| 14 | 5.35 | 6.37 | 5 54 | 6.10 | 9.27 | 8.20 |
| 15 | 5.36 | 6.37 | 5 55 | 6.9 | 10.27 | 9.23 |
| 16 | 5.36 | 6.36 | 5.55 | 6.7 | 11.30 | 10.29 |
| | | | | | p.m. | |
| 17 | 5.37 | 6.35 | 5.56 | 6.6 | 12.37 | 11.38 |
| | | | | | | p.m. |
| 18 | 5.38 | 6.34 | 5 57 | 6.5 | 1.44 | 12.42 |
| 19 | 5.38 | 6.34 | 5.57 | 6.4 | 2.49 | 1.44 |
| 20 | 5.39 | 6.33 | 5.58 | 6.3 | 3.52 | 2.44 |
| 21 | 5.40 | 6.32 | 5.58 | 6.2 | 4.51 | 3.38 |
| 22 | 5.40 | 6.31 | 5.59 | 6.0 | 5.43 | 4.25 |
| 23 | 5.41 | 6.30 | 5.59 | 5.59 | 6.26 | 5.4 |
| 24 | 5.42 | 6.29 | 6.0 | 5.58 | 7.2 | 5.36 |
| 25 | 5.42 | 6.28 | 6.0 | 5.57 | 7.37 | 6.13 |
| 26 | 5.43 | 6.27 | 6.1 | 5.56 | 8.9 | 6.39 |
| 27 | 5.44 | 6.26 | 6.1 | 5.55 | 8.40 | 7.10 |
| 28 | 5.44 | 6.25 | 6.2 | 5.53 | 9.11 | 7.42 |
| 29 | | | 6.2 | 5.52 | | 8.16 |
| 30 | | | 6 3 | 5.51 | | 8.54 |
| 31 | | | 6.3 | 5.50 | | 9.38 |

## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | | |
|---|---|---|---|---|
| 2 | Feb. | ☽ | Last Quarter | 12 10 a.m. |
| 10 | ,, | ● | New Moon | 3 55 a.m. |
| 17 | ,, | ☾ | First Quarter | 10 22 a.m. |
| 24 | ,, | ○ | Full Moon | 4 58 a.m. |

Apogee, 4th February, at 6 30 p.m.
Perigee, 20th February, at 4 30 p.m.

As the Sun will be apparently amongst the stars of Capricornus from the 1st to the 17th that constellation will be on the western horizon at sunset, and the arch of zodiacal constellations, stretching from east to west at 8 p.m., will be :—Aquarius, Pisces, Aries, Taurus, Gemini and Cancer. At the end of the month, at 8 p.m., Aquarius will have disappeared in the west and Leo come into view on the eastern horizon.

The Southern Cross will rise early in the evening in the south-east with head bent slightly downwards; but at 10 p.m. on the 1st, and at 8 p.m. on the 28th, it will be in a horizontal position.

Mercury will be passing from the east to the west side of the Sun on the 7th, with its dark side to the earth; Later on in the month it will be visible in crescent-shape (in a telescope) before sunrise.

Venus will reach its greatest distance east of the Sun, 47 degiees, on the 7th, when it will set about 8·55 p.m. This brilliant planet and the crescent Moon will grace the western sky, about 9 degrees above the great Square of Pegasus, early in the evening on the 13th.

The occultation of Jupiter by the Moon on the 15th between 5 and 6 p.m., though occurring in daylight, will be an interesting event. The time of Jupiter's disappearance will depend upon the position of the observer, and will be earlier in the southern parts of Queensland than in the northern.

Mercury will set 29 minutes after the Sun on the 1st, with the Sun on the 7th and on the 14th at 5·38 p.m.

Venus will set at 9·6 p.m. on the 1st and at 8·45 p.m. on the 14th.

Mars will rise at 10·40 p.m. and set at 8·48 a.m. on the 1st. On the 14th it will rise at 10·53 p.m. and set at 9·3 a.m.

Jupiter will rise at 11·34 a.m. and set at 10·50 p.m. on the 1st. On the 14th it will rise at 10·49 a.m. and set at 10·3 p.m.

Saturn will rise at 2·4 a.m. and set at 3·46 p.m. on the 1st. On the 14th it will rise at 1·18 a.m. and set at 2·58 p.m.

| | | | | |
|---|---|---|---|---|
| 3 | Mar. | ☽ | Last Quarter | 9 9 p.m. |
| 11 | ,, | ● | New Moon | 6 36 p.m. |
| 18 | ,, | ☾ | First Quarter | 5 41 p.m. |
| 25 | ,, | ○ | Full Moon | 5 46 p.m. |

Apogee, 4th March, at 2·54 p.m.
Perigee, 18th March, at 12.24 a.m.

Mercury will be at its greatest distance, 27 degrees west of the Sun, on the 4th. It will, therefore, be a morning star rising at 3·47 a.m.

The Moon will be passing Saturn about 8 a.m. on the 5th when Saturn will be about 8 diameters of the Moon below or northward of it. It will also pass Mercury at the same apparent distance on the 9th before midday.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. 1 MARCH, 1929. PART 3.

## Event and Comment.

### Banana Grade Standards—Efficiency in Industry.

"I HAVE a responsibility as Minister for Agriculture to the people of Queensland, and that is to see that our primary industries are developed and placed on the most efficient basis possible." That was the text on which Mr. Forgan Smith based a strong reply to a deputation representative of Queensland banana growers, and which recently discussed with him certain matters relating to the enforcement of the new grade standards for bananas. Continuing, the Minister said, *inter alia*, that Australia is definitely a nation that has adopted high standards of living. The inevitable corollary of that was high standards of efficiency in all sections of industry. In short, they could not maintain a white man's standard on faulty methods of cultivation or production in industry. That fact was apparent to every investigator and any one with only an elementary knowledge of economics. The banana industry was one that particularly engaged their attention in Queensland. It was suitable to their climatic and soil conditions in different portions of the State. It was an industry peculiarly suited to closer settlement—a very important thing in a State like Queensland—and, because of that, it was necessary to build it up and foster it in every reasonable way. The Government of the Commonwealth had agreed with those principles and had imposed a tariff amounting to an embargo against bananas grown outside of Australia. That protection was of great benefit, enabling the Queensland industry to be carried on under the white man's standards of which they all approved. With protection of an industry, a responsibility was cast upon those engaged in that industry to do their part in justice to the rest of the people of Australia. In other words, a protected industry, for which the tariff impost was adequate, owed an obligation to the people of the Commonwealth to

supply them with a commodity high in quality and of sufficient quantity to meet their demands. That positive statement of the position could not be combated by any reasonable citizen. By means of the Banana Cultivation Act they had endeavoured to keep the cultivation of the banana in the hands of their own people; and as a result of that legislation and the Federal fiscal policy the banana industry had expanded. The degree of their success in banana production might vary with climatic or soil conditions, or as between individual and individual, but, generally speaking, banana growing in Queensland had expanded as a result of the policy to which he had referred. Unfortunately, in the course of the last year or two, the industry had faced many difficulties due to disease and other causes. Certain areas, where formerly fruit of high quality had been produced, had gone out of cultivation, only temporarily it was hoped, on account of bunchy-top infestation. In other cases, owing to the selection and cultivation of unsuitable land, or to faulty methods of cultivation, a fruit of lower than average quality had been produced and offered for sale, and, as a consequence, a serious agitation had developed in the Southern States which provided their chief markets. No trade could be placed on a permanently satisfactory basis unless that business was carried on with a reasonable degree of efficiency. As a result of communications received by the Government, investigations into the position had been made in the South. He had personally investigated the matter and had come to the conclusion, on the evidence he had seen himself and on the evidence placed before him by officers of the several Departments of Agriculture whose duty it was to see to those things, that the banana industry was being seriously menaced by a certain section of growers who were seriously retarding the progress of the whole industry. While he remained a member of the Government he would not allow a small percentage of growers to depreciate the value of that industry to the State and neutralise efforts made to win and maintain for it satisfactory markets. Seventy-five per cent. of the bananas going to the South were of quite good quality, but the remaining 25 per cent. left very much to be desired. He had been shown cases of bananas graded in a manner that was no indication of the contents of the case at all, fruit of all sizes being packed in one case, and in others fruit too small in size to be of any marketable value.

The Minister went on to particularise other cases of faulty grading and wrong description of consignments, and made some illuminative observations on some of the ripening methods in vogue in the South.

## Queensland Bananas in the South.

IN the course of his inquiries in the southern capitals, Mr. Forgan Smith informed the deputation, he found Queensland bananas of high quality being sold as the product of Fijian plantations. The best bananas he saw in Melbourne came from the Byfield district in Central Queensland, and they were being exhibited in fruiterers' windows as Fiji bananas. On inquiry, the explanation was that they were of the type that were formerly procured from Fiji. One vendor put it rather humorously to him. "We are not," he said, "contending they were grown in Fiji but they are of the type or quality of Fiji bananas—just, for example, as Scotch shortbread is sold on the market, but is not claimed to be made in Edinburgh." However, it was interesting to note that bananas of good size and quality brought a ready market. The Byfield bananas to which he had referred were being readily retailed at 3d. each. The fruiterers told him that there was no limit to the quantity of that type that could be sold. There was a greater demand and a better price offering for the large fruit. All the things that he had mentioned indicated the necessity for immediate action in placing their marketing arrangements on a much more satisfactory basis. It was the responsibility of the Government of the State to see that no section of an industry was allowed to injure its whole trade or destroy one of the important sources of wealth production in Queensland. In addition, attempts had been made to market fruit that was of no quality at all. They saw on his table some rejected bananas offered since the Regulations came into force,

marked as "special" and "standard" that were not of the quality of any of the grades admitted to be adequate or fair. The exhibits were a fair indication of the average of the contents of the cases from which they had been taken. Having regard to the position as he saw it in the Southern States, and having regard to the quality of the bananas that were grown and could be grown in Queensland, it did not appear to him that the prescribed standards were unduly high if they desired to keep their markets and extend them on a satisfactory basis.

## Queensland Grades Accepted.

ALL the States of Australia to which Queensland bananas have gone, said Mr. Forgan Smith, have approved and accepted the proposals made by the Queensland Government. The New South Wales Government had even queried them on the ground that they were not drastic enough. However, the Southern Departments were prepared to give the Regulations a fair trial with a view to placing the industry on a satisfactory footing. It was his view that those Regulations should be given a fair trial, and that growers should endeavour to co-operate wholeheartedly with the Department to that end. It was his intention to recommend to the Government the introduction of a Bill in the next session of Parliament to deal more adequately with many other phases of the banana industry, the necessity for which had recently become so apparent. If it were necessary to reconsider the question of Regulations later on, it could be done when that Bill was before the Legislature. It was his desire and intention to recommend an amendment of the Banana Cultivation Act which would deal with the cultivation of bananas, the diseases to which the fruit was subject, and other related matters.

## The Machine on the Farm.

THE coming tractor school at the Queensland Agricultural High School and College will serve, in addition to its other advantages, as an excellent illustration of the development of agricultural implements and machinery to meet the changes that are taking place in country conditions in Australia. The mechanisation of agriculture is proceeding apace, providing a ready means of adjusting high and rising costs of production. Though the engineer has not completely solved our agricultural problems, nor is he likely to, yet to his ingenuity we are indebted greatly for much of our progress towards that end.

The economic utility of the modern tractor with its speed and power is a case in point. Half the job in farming is to be able to get on to the land when weather and soil conditions are suitable and have the ploughing done as quickly as possible, and that is where the tractor proves its great advantage. Present developments in tractor design are in the direction of evolving a dual purpose type that will be as useful on the road as in the field.

Machinery, where its use is an economical proposition, is also helping to reduce the cost of harvesting and numerous other field operations. On the dairy farm mechanical milking is to-day vastly different from what it was even ten years ago; and improved types of machinery are now available which are not only efficient in their work as labour savers, but also ensure cleanliness in the product equal to that obtainable by the most hygienic manual methods.

The success of mechanised agriculture is, as in other things, made or marred by the human element, and that this fact is widely recognised is evident by the stress now laid on the importance of agricutural engineering in college courses. The power plant is now an indispensable unit of most farming outfits, and the mechanic is a new addition to skilled farm and station labour. In the world to-day there is an ever-widening field of opportunity before those who have a mechanical bent, and it is stimulating to see the extent to which the machine on the farm is engaging the attention of engineering genius. It is also good to observe the keen enthusiasm of the staff of the Queensland Agricultural High School and College in providing opportunities for farmers to study and use, under actual field conditions, the newest types of tractors and other modern agricultural machinery.

# Bureau of Sugar Experiment Stations.

## ENTOMOLOGICAL HINTS TO CANEGROWERS.

### Too Late for Fumigating Cane Grubs.

Little or no opportunity for fumigating grub-infested land is likely to occur during this month (March), on account of advanced growth of the cane, which in most places has now become high enough to meet overhead between the rows, and by shutting out the sunlight, to prevent speedy evaporation of moisture from the soil. After commencement of the wet season it generally happens that successive heavy showers render such shaded land too wet for effective treatment, since the interstices or tiny air spaces between the soil particles remain continually filled with surplus water which has little chance of draining away or being removed by a brisk evaporation.

On very well-drained high lands of volcanic origin and excellent soil porosity it may still be possible to use paradichlorobenzene effectively on third-stage grubs of *Lepidoderma albohirtum* Waterh. before they have had time to seriously injure or kill certain stands of late-planted cane.

### Prepare to Fight "Army Caterpillars."

Larvæ of our various species of Army or Grass Worms may suddenly invade canefields this month in more or less formidable numbers; so that it is well to be ready to meet any attack that may happen to demand prompt repressive action.

When an army of caterpillars chances to assume vast dimensions, it becomes advisable to at once communicate with the Entomologist at Meringa Experiment Station.

Ordinary outbreaks, however, can generally be effectively controlled by spraying the cane leaves with lead arsenate, in such manner as to form a poisoned strip or band of about three cane rows wide immediately in front of the line of advance taken up by the caterpillars. Use 2 lb. of lead arsenate in about 50 gallons of water; taking care to keep the mixture well agitated whilst spraying it over the leaves, in order to ensure and maintain uniform suspension of chemical in the water. Either of the following spray pumps will be found useful for such work; and no large cane farm should be without some such appliance—the "Rosebery" Hand Sprayer, No. 502, Buzacott and Company, Ltd., Brisbane and Sydney; Compressed air "Knapsack" Sprayers, Smellie and Company, Brisbane, &c.

### Trapping Beetle Borers.

Amongst the various artificial methods practised for controlling the numerical increase of the weevil borer *Rhabdocnemis obscurus* Boisd., that of trapping the adult beetles deserves special mention, as being one of the simplest and at the same time most effective; one which costs nothing and is within the reach of every canegrower.

As already pointed out by us in different reports, a bait-trap of this kind consists merely of about twenty or more pieces of soft juicy cane stick about a foot long, split in half lengthwise and laid side by side in a compact heap with the cut surfaces downwards. These little heaps are placed at distances of about three chains apart along the headland of an affected field, under shade of the stools forming the edge of the cane block. They should be kept covered over with enough trash to exclude daylight and prevent the split cane from drying too quickly. These bait-traps should be visited every second day, and after collecting the weevils found in them the sticks must be replaced and covered over as before.

# CANE PESTS AND DISEASES.

*Mr. E. W. Mungomery, Assistant Entomologist, Bundaberg, has submitted the following report for the period January-February, 1929, to the Bureau of Sugar Experiment Stations:—*

## A New Sugar Cane Insect Pest (*Crambus malacellus* Duponcel.).

Recent scoutings for insect pests in the Isis district have revealed the existence of a new lepidopterous cane pest, which, hitherto, had not come before our notice. This new lepidopteron was found by Mr. G. Bates when investigating an outbreak of army worms in the Kowbi area during December last, when several "dead hearts" were noticed amongst the cane damaged by the latter pests. The insect under consideration is a caterpillar borer which eats into the central heart of the young cane shoots, causing the "dead hearts" formerly referred to. The damage resembles that caused by the Noctuid moth borer (*Phragmatiphila truncata* Walk.) in young cane, but the caterpillars differ noticeably in their structure and habits. Specimens were accordingly collected and bred to the moth stage, and Dr. Jefferis Turner, to whom the specimens were sent for determination, has kindly identified them as *Crambus malacellus* Dup. This moth belongs to the family *Crambidæ*, a group commonly known as "grass moths," and it is of interest to note that several important pests in other countries are contained in this family. In this connection might be mentioned the borer *Diatræa saccharalis* Fabr. of Louisiana, and *Chilo simplex* of India, both of which are representatives of this family and important cane pests in their respective countries, whilst several species of the genus *Crambus* are destructive to corn and grassland in North America.

In the area infested by this pest, young Badila ratoons were found to be damaged, shoots as small as 2 inches in height as well as larger ones up to 12 and 18 inches being injured. The larvæ have the peculiar habit of constructing silken galleries out of particles of earth, vegetable matter, and other debris which is webbed together, and from this vantage point, they eat right through into the central heart of the shoot. From this habit they have earned for themselves the name of "web-worms." Injury to the plant usually takes place on a level with the ground surface, but occasionally it is either a little above or below this point. Damage was estimated at about 1 per cent. of the total number of shoots in the infested field, but since all the shoots in a stool do not come to maturity, the real damage must be considerably below this figure.

### General Description of the Various Stages of the Insect.

The larva or caterpillar is cylindrical and when full grown measures $\frac{1}{2}$ to $\frac{5}{8}$ inches in length (1.5 cms.). The head is of a pale yellowish-brown colour, with slightly darker irregular markings or blotches towards the vertex and sides. The cervical shield is darker than any other portion of the body, being a dirty black on the dorsal area and fading off gradually towards the lateral margins. The body is whitish, each segment bearing two rows of slightly raised dark spots or tubercles, which give the appearance of two interrupted transverse bands running from each side across the back, the anterior row of spots being larger than the posterior row. Each tubercle usually bears one seta or hair. The larva pupates in the soil within a silken web similar to that used as a retreat when eating into the cane shoot.

The pupa is about $\frac{5}{16}$ of an inch in length, being coloured pale brown. For some time prior to the emergence of the adult, the eyes begin to get darker, and immediately before, the darker pigment of the wings also becomes noticeable.

The moth is a small whitish species, with a wing expanse of $\frac{5}{8}$ to $\frac{3}{4}$ of an inch, the forewings bearing two pairs of silver longitudinal stripes. A small stripe runs along the costal margin broadening out as it approaches the tip, near which it is interrupted by four white lines intruding fanwise into the silver area. Parallel with this costal stripe is another which runs through the centre of the wing and which also widens slightly towards the outer margin. Between these two stripes, running parallel and near to the outer margin, is a thin silver band. A darkening is also visible on the inner margin of the wing.

The hind wings are white and semi-transparent, with a faint darkening along the outer margin and following the veins for a short distance inwards. The body is white with silver markings on the thorax near the junction of the wings, and the palpi which are large and snout-like, have their outer surfaces edged with silver.

Similar species of moths are frequently abundant in grassland and when disturbed fly in erratic short flights. When they alight, they are usually found resting along the length of a twig or grass shoot with their wings closely folded round their bodies. This gives them a cylindrical appearance and renders them less conspicuous.

### Distribution and Economic Position.

The species *C. malacellus* Dup. is widely distributed, being found in such countries as New Guinea, Borneo, India, Africa, and Europe, whilst it has also been known in Australia for a considerable time, records extending from Sydney to as far north as Cooktown. Most likely it is indigenous to this country, and in addition to sugar cane, it probably feeds on various grasses. With reference to its economic position in sugar cane entomology, it is unlikely that this insect will ever be anything but a minor cane pest. This view is supported by the fact that this insect has been known to occur here for some time past, but up to the present time it has not been known to occasion any more than a little local damage, which is almost negligible. It therefore, appears to be kept under efficient control by several natural enemies, which prey on or parasitise caterpillars and moths. Also, although it occurs in other countries where sugar-cane grows, it has never been reported as causing injury to that crop.

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## CANE PEST COMBAT AND CONTROL.

*Mr. E. Jarvis, Entomologist to the Bureau of Sugar Experiment Stations, has submitted the following report on some of the activities of the Meringa Experiment Station during the period January to February,* 1929:—

### Preventing Oviposition of "Greyback" Cockchafers.

The advisability of attempting to deter egg-laden "greyback" beetles from ovipositing in canefields was pointed out by the present writer about thirteen years ago (1915), although it was not until six years later (1921) that initial field experiments in this connection were commenced on the "Carrah Estate," near Meringa. The various deterrents tested at that time, with a view to inducing cane beetles to avoid such treated areas, were—coal tar, naphthalene, chloride of lime, tobacco dust, and carbolineum emulsion; each experiment plot consisting of one-eighth of an acre, and being separated by suitable check areas. To avoid labour of emulsifying and spraying, the tar was prepared by mixing the quantity needed (2 gallons = 16 gallons per acre) with five kerosene tins full of dry sifted soil, so that the deterrent could be easily sprinkled in a demi-dry condition on each side of and between the cane stools, in a strip about 3 feet wide.

When examined twelve days later (0.15 inches of rain having fallen during this interval) the tarry odour was quite pronounced, and even after twenty-six days remained perceptible, although, perhaps, not sufficiently so to be repellent. The chloride of lime—which was also mixed with soil, and applied at the rate of 160 lb. per acre—maintained its odour nearly a week, but lost it about nine days after application. The naphthalene was administered at the rate of about 120 lb. to the acre, and kept its repellant odour longer than the lime chloride.

Unfortunately, owing to the scarcity of cane beetles on this estate during the course of these experiments, results were inconclusive, as no grub-infestation occurred on either the treated or check plots.

Although attention was drawn by the writer to the possibilities of paradichlorobenzene as a deterrent against egg laying, in the year 1915 ("Queensland Agricultural Journal," vol. III., p. 263), field tests with this chemical were not commenced

until the year 1923, when experiment plots were established at Woree and elsewhere. With a view to following up a question of such economic interest, additional field experiments with paradichlorobenzene were carried out last November at Meringa and Banna.

### Paradichlorobenzene as a Deterrent against Oviposition.

The crystalline nodules of this fumigant—after being passed through a quarter-inch-mesh sieve—were applied to plots of one-tenth of an acre by means of a machine operating on the same principle as a corn planter, but which had been adapted by us for such work. These plots were treated about a week after the first appearance of cane beetles (*Lepidoderma albohirtum* Waterh.), by burying doses of one-eighth of an ounce (apoth.) about 3 inches deep on each side of the cane rows, at intervals of about 15 inches apart, and 7 inches from the nearest cane shoots. A special roller attached at the rear of the machine served to consolidate and level the disturbed soil above the line of fumigation.

Used as a deterrent, paradichlorobenzene is best applied to the soil between cane rows just after emergence of the beetles, in order that the ground may have ample time to become impregnated with the objectionable odour before invasion of a plantation by egg-laden female beetles.

Plots laid down this season (1929) were fumigated, as described above, at the rate of 120 lb. of paradichlorobenzene per acre. In addition to acting as a deterrent against oviposition of the beetles, the amount used would remain operative in the ground for a month or longer, so that in the event of eggs being deposited later on by beetles making a late emergence, these eggs, or any first-stage hatching from same would be destroyed. Early applications of this kind are often desirable on certain classes of soil, since they can be made well in advance of the wet season, at a time when the soil is thoroughly open to such fumigation.

### Growers should Read the following Notes on Fumigation.

When fighting any kind of insect pest, the economic entomologist aims not only at discovery of the cheapest and safest remedy, but also seeks to administer the same in the simplest and least expensive manner possible.

In the case of paradichlorobenzene which is cleanly to handle, dry, and non-poisonous to human beings and domestic animals, the ideal method in which to apply this fumigant will, in the near future, be found to be by means of some suitable fertilising machine, of a type that will bury manure about 4½ inches deep, cover in the drill, and slightly consolidate the disturbed soil above the manure by passing broad-tyred wheels over same.

When giving the final dressing of manure, at a time when the cane is 4 to 5 feet high, the dry crystalline nodules of paradichlorobenzene—after being passed through a ¼-inch-mesh sieve—are thoroughly mixed with the fertiliser.

In this manner the two can be applied to the soil in the one operation, which is a part of the usual routine field work. Moreover, at such stage of growth of the cane the grubs will still be small, so can be destroyed before having had time to work appreciable or serious injury to the roots.

The fumigant should be mixed with the manure in a proportion that will ensure the administration of about 120 lb. of the former per acre.

*A VALUABLE AID TO THE FARMER.*

*A Nambour farmer, renewing his subscription to the Journal for two years, writes (20th January, 1929):—"I eagerly await the monthly issues of the Journal, as each issue has something new and interesting to the man on the land, and, in my opinion, every farmer who wants practical hints and useful information as regards farming could not do better than subscribe to the Journal."*

# THE POTATO TUBER MOTH.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

THE potato tuber moth (*Phthorimæa operculella* Zell.) occurs throughout the various States of the Commonwealth, and is generally throughout the various States of the Commonwealth, and is generally considered the most destructive insect enemy of the potato in this counry. It was recorded as early as 1854 in Tasmania, and Tryon discussed its ravages in Queensland in 1889. There is much controversy with respect to the native home of this pest, some writers believing it to be of North American origin, while others consider its home is North Africa. It is an insignificant moth belonging to the family Gelechiidæ.

## Nature of Injury.

The injury inflicted by this pest is of a twofold nature, for it may attack the aboveground portion of the plant or it may attack the tubers. Injury to the former is due to the larvæ of the moth mining in the leaves and leaf stalks and tunnelling in the stems. This damage to the foliage and stems may be quite appreciable, but is not generally considered nearly so serious as the injury to the tubers. In the tubers this pest, in its larval stages, may burrow and tunnel to such an extent as to very greatly depreciate their market value.

## Plants Attacked.

Among the plants recorded as being attacked by this pest are the following:—Potato, tobacco, egg plant, Cape gooseberry, and tomato. It is, however, of importance as a pest only on the first two mentioned plants. On the potato it is, as already indicated, referred to as the potato tuber moth; whereas, when attacking tobacco, it is more commonly called the tobacco leaf miner or the tobacco split worm. In addition to attacking the abovementioned plants of economic importance, it also feeds on a number of weeds belonging to the Solanaceæ or potato family, included among these being the common nightshade (*Solanum nigrum*).

## Life Cycle Stages and Life History.

The oval-shaped pearly-white eggs are extremely minute, and can just be seen by the naked eye. They may be laid on the leaves or stalks or on the tubers, and may also be found on the sacks in which infested potatoes are stored. When laid on the tubers they generally occur in clusters, and are usually laid in the eyes or at a scar on the surface of the tubers. On the foliage they do not occur in clusters, but may be found occurring singly, generally on the underside of the leaf. In the open, egg-laying does not usually take place during the day, but it is believed that in dark stores it takes place quite readily at all hours. Life history studies in North America have shown that the moth lays from 150 to 250 eggs over an egg-laying period of from one to two and a-half weeks.

At the end of the usual incubation period the larvæ hatch from the eggs, and if these have been laid on the leaves the larvæ commence mining in the foliage between the upper and lower surfaces of the leaves. If the eggs have been laid on the tubers the larvæ eat through the skin and either tunnel under the skin or burrow towards the heart of the tuber, eventually forming tunnels which may be two or three inches long. Infestation is most serious when it takes the form of

burrowing towards the heart of the tuber. When full fed the larva is slightly less than half an inch in length, and is white in colour with a faint pink tinge.

The full-grown larvæ generally leave the tubers to pupate, although they may do so just within the entrance to their tunnels. The pupa is formed within a silken cocoon, and may be found on the outsides of the tubers or between folds of sacking, or indeed in any of at least half a dozen other situations. Pupæ formed by the larvæ that have been mining in the leaves and tunnelling in the stalks may commonly be found among the dead, withered leaves or under lumps of soil. The pupa is slightly more than one-third of an inch in length, and is dark brown in colour.

The usual transformation processes take place within the pupa, and eventually the insignificant greyish-brown moth emerges. It has a wing spread of about half an inch, and a body length of about a-quarter of an inch. The moths mate, egg-laying takes place, and so the infestation continues.

## Control Measures.

Control measures should aim very largely at safeguarding the tubers —firstly when they are in the soil, secondly while they are being harvested, and thirdly when they are subsequently in storage. Tubers in the soil may be attacked by this pest, and hence it is desirable to adopt cultural practices that will minimise the danger at this stage. For this reason it is a wise precaution to plant as deeply as is practicable, and to keep the thoroughly pulverised soil well hilled up so that the tubers will not be exposed. Once the tubers are exposed infestation will become serious. As the common night-shade weed is a host plant of this pest it should as far as possible be destroyed.

At harvesting certain precautions should be adopted, among the more important of which are the following:—The potatoes should be bagged and removed as soon as possible after digging, and furthermore the bags should be sewn up as soon as they are filled. The tubers should never be left overnight in the field exposed to the attacks of the moths, because if that is done many thousands of eggs may be laid on them and subsequently severe losses will be experienced in storage when the larvæ hatch out of the eggs. Furthermore, the harvested potatoes should on no account be covered with the tops, because if these are infested the larvæ will desert the fast withering leaves and stems and burrow into the tubers. The potato tops, according to Australian authorities, should be burned as soon as practicable after the harvesting of the tubers. An American investigator, however, recommends that such a practice be abandoned because of the destruction of the parasites that may be associated with the tuber moth. The question of parasite control raised by this recommendation seems worthy of some further investigation in Queensland to determine to what extent useful parasite control exists in this State. The harvested tubers should, if possible, be kept in a storeroom to which access by the tuber moth is not readily obtainable. The not infrequent practice of leaving tubers heaped up in an exposed condition in an unclosed storeroom merely invites serious trouble.

Fumigation of tubers that have become infested with potato tuber moth larvæ has been recommended in the United States, carbon bisulphide being used at the rate of 2 lb. to 1,000 cubic feet, the duration of fumigation being forty-eight hours. It is said that, under American conditions, the treated tubers are not injured, and that the whole of the larvæ and moths and the great majority of the eggs and pupæ are killed. The fumigation may have to be repeated if infestation continues.

## THE BUFFALO FLY.

### MINISTERIAL STATEMENT.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, said recently in the course of a Press statement, that the presence of Buffalo Fly in Queensland was a matter of grave concern to the pastoral industry of this State and of the Commonwealth generally.

The fly was first detected in the Northern Territory many years ago. From the Territory it has already spread westward, and for some years past it has been a menace to the cattle industry in the northern portion of Western Australia.

In January, 1927, the attention of the Commonwealth Government was called to the possibility of the fly spreading from the Northern Territory into Queensland if an effort were not made to restrict it to the Territory, but in this connection, nothing in any way effective was done by the Commonwealth Government in preventing the spread of the fly eastward and southward of the coastline and across the border into the Gulf country of Queensland.

There is no doubt that the fly has come to Queensland from the Territory. The State Government, some time ago, approached the Commonwealth Government and suggested that the matter of bringing this pest under control should be treated from a national standpoint and that the action necessary to restrict the spread of the fly should be taken by Commonwealth authorities. Unfortunately, the latter have not definitely advised the State Government as to whether or not they are prepared to treat the matter as of national concern. This delay is much regretted, for it obviously increases the risk of infestation of Queensland herds. The State Government intimated to the Commonwealth Government its preparedness to co-ordinate with it in any reasonable way in regard to any investigations that may be considered necessary.

**Biological Control.**

It is now understood that definite arrangements have been made to carry out the necessary preparatory investigations with the view of bringing the pest under biological control. There is a possibility that this may be found a satisfactory means of checking the spread of the fly and reducing the seriousness of its menace to stock; but in the event of a suitable predatory insect being discovered, it will probably be some years before its influence may be manifested. It is, therefore, necessary that some method of restricting the extension of the fly should be made operative in the interim.

Action has been taken in this State to declare the condition arising from infestation by the Buffalo Fly a notifiable disease under the Diseases in Stock Act, and the stock crossing place near Wollogorang, has been closed, and in practice, this means that no stock may enter Queensland from the Territory north of Camooweal. The question as to whether or not the closure of additional stock crossing places shall be necessary to further protect the cattle industry of Queensland is now under consideration.

Additionally, all possible precaution is being taken by the State Government to keep the fly in check pending receipt of definite advice of the attitude of the Federal Government on the matter.

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## QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The White Bean is a straight-stemmed tree which attains a height of about 100 feet and a stem diameter of about 2 feet. It is known to botanists as *Ailanthus malabarica*. Another botanical name, bestowed upon it by Ferdinand Mueller, is *Ailanthus imberbiflora*, but it is evidently the same species as the Indian one which is known as *Ailanthus malabarica*. The bark is grey or brown, often very finely scaly, and exudes an almost colourless resin. The wood is light in weight, pale in colour, and is not highly figured. It could be used for indoor work where lightness is required and there is no demand for ornamental markings. Dr Lauterer stated that the resin makes a good ointment for chronic ulcers. He also suggested that it might be used for softening hard and quickly-drying varnishes. The trees are found in the "brush" forests of Northern New South Wales (C. Moore) and in Queensland, as far north as Bowen. It is also found in India, Ceylon, and Cochin China.

*Photo.: W. D. Francis.*]

PLATE 65.—THE WHITE BEAN (*Ailanthus malabarica*).

A tree in the Imbil Rain Forest. A large Bird's Nest Fern (*Asplenium nidus*) is shown on the tree in the upper part of picture.

*Photo.: Department of Agriculture and Stock.*]

PLATE 66.—WHITE BEAN (*Ailanthus malabarica*).

A, portion of leaf; B, flowering bearing twig; C, fruit-bearing twig.

# THE POULTRY INDUSTRY OF QUEENSLAND.

## SOME ECONOMIC PHASES.

The economic condition of the poultry industry is at present the subject of close consideration by all interested in it. This article does not cover the whole range of poultry keeping (ducks, geese, pigeons, &c.); it rather analyses some phases of the business of egg production, and seeks to emphasise the necessity of the adoption of up-to-date methods by individual poultry keepers. There has been a tendency in some directions to take up poultry keeping with a lack of appreciation of what is involved. It has to be observed that haphazard and ill-directed poultry keeping cannot possibly be remunerative to those concerned, although the resultant egg production may menace the livelihood of those in the industry who are working along approved lines.

Consideration of the details of farm economics by the individual is therefore just as important as collective action by the producers generally in matters of major industry economics. It is principally the former phases that are herein examined. It would be preferable for anyone contemplating taking up poultry keeping to pause before doing so, unless he is prepared to employ only systematic methods, and to do so consistently and in every department of the business. Much disappointment would thereby be obviated.

Within recent years the purchase of day-old chicks as a rapid way of commencing business has become extensive. Consideration, however, should be given to the points emphasised in this article as to the use of stock of high producing strains. There has been a tendency to use eggs regardless of their source of origin, and it is important that purchasers of day-old chicks should appreciate this factor.

### DOMESTICATION.

Poultry have not always been domesticated. The present farm flocks had for their progenitors the wild fowl of the jungle. These wild fowl were certainly not as prolific as the fowl we have to-day, and without the controlling hand of man the latter would revert to the habits of their predecessors. Continuous egg production is a feature which has been evolved in the breeding of domesticated fowls, and even then this is only possible when the birds are correctly fed.

**IMPROVE EGG SIZE**

**by hatching only from eggs over 2 oz. in weight and by purchasing only day-old chickens from breeders who follow this practice.**

Where reversion to natural type and conditions takes place, egg production becomes limited to the extent necessary for regeneration in the most favourable months of the year—the breeding season—when the birds are in good physical condition, and when the natural supply of food is most abundant. A plentiful supply of food, and the genial climatic conditions of the spring months, the natural breeding season, induce, in the first place, egg production and give reasonable assurance

of a supply of food for the young. The business of the poultryman is to adapt these characteristics to be of maximum use to man. He must maintain his stock in perfect physical condition for as long as possible throughout each year. To do this, every effort must be made to make the surroundings of the poultry approach, as nearly as possible, the genial conditions of spring, while, in feeding, animal food of some kind must be supplied, for insect life is largely the natural food supply of birds.

**What are the poultry products which may with advantage be developed?**

There is the flesh, which, properly served, is a valuable and most palatable food, but we in Queensland have a very large number of cattle, sheep, and pigs, and poultry flesh is subject to keen competition from these sources. Not losing sight of the possibilities of poultry meat, it would be as well to stress the value of the egg—the field peculiar to poultry—for which a more popular demand could be developed by the retention of its natural quality, as it is most nutritious, containing all the essential elements for the building up of bone, flesh, &c., necessary for our physical maintenance and development.

## What of the Poultry Industry in Queensland?

On account of the genial climatic conditions and the general abundance of succulent herbage during the greater portion of the year, poultry raising is extensively engaged in throughout the whole of the State. Numerous farmers make poultry raising their sole source of income. Others engage in this industry as an adjunct to general farming, while the practice of the suburban householder to keep a flock is general.

**BREED FROM VIGOROUS STOCK.**
**Healthy, vigorous breeders produce strong chickens.**

On poultry farms where producers specialise in the industry, the production per bird is greater than when it is carried on as an adjunct to other work; also the product reaches the consumer in a much fresher state and therefore commands higher values.

The mixed farmer may obtain, by systematic breeding and feeding, production equal to that of the specialist. By forwarding his eggs to market twice weekly during hot weather and once weekly during the winter, he obtains values very little, if any, below those received by the producer within easy reach of the market. By regularly placing on the market an article of reliable quality, he will assist in increasing the per capita consumption, and thus reduce gluts.

**What, then, are the factors of success in poultry raising?**

**In the rearing of his stock the poultryman must pay heed to the natural processes, and to avoid losses he must provide against unfavourable conditions.**

**In the commercialising of the main poultry product (eggs) he must maintain the health and vigour of the bird that is natural to the mating and breeding season, by judicious housing and proper feeding.**

**In the study of marketing, he must cater for the consumer by producing eggs of standard size, and delivering them to the markets in a fresh and clean condition.**

Generally, then, the essentials of successful poultry keeping may be summarised as follows:—

(1) Proper housing to afford protection from unfavourable weather conditions, and to ensure virile stock.
(2) Economy and efficiency in rearing young stock.
(3) Birds of suitable type with heavy producing capacity and laying standard-sized eggs.
(4) Close attention to market requirements to ensure remunerative prices. (See page 221.)
(5) Feeding to induce maximum production.

### Housing.

A survey of many farms indicates that one of the principal causes of impaired health and high mortality is due to inadequate housing. It is not the case only that the housing accommodation is too small, but that it is of the wrong design and does not lend itself to the easy maintenance of those sanitary conditions necessary to health and vigour. Elaborate and costly houses are not necessary, but they should be of sufficient size for easy access, and the floors should be as impervious as possible, such as concrete, so as to permit of thorough cleaning at definite periods. Buildings are generally erected for a definite number of birds, but it is found that, as the flock increases, the tendency is to use these buildings for greater numbers than those for which they were originally designed. This evil is not only noticed with reference to the accommodation of adult stock—where the least harm is caused—but it is more pronounced in the accommodation used for the rearing of young chickens and growing stock.

**HATCH CHICKENS EARLY.**

**Early hatched chickens (July, August, and September) produce the greatest number of eggs when values are high.**

The success of a poultry raiser is dependent firstly upon the number of chickens that are reared to maturity, and, as overcrowding is one of the principal causes of mortality amongst chickens, the consequences of insufficient accommodation become most serious as a poultryman extends his business. It has also to be borne in mind that the loss through overcrowding does not end in the death of chickens. Others may survive improper treatment, but their health and vigour are so impaired that their potential egg yield is greatly decreased.

## SYSTEMS OF ACCOMMODATION.

There are three practices commonly adopted, viz.:—

(1) Intensive, where the birds are kept entirely under cover;
(2) Free range, where a house is erected to provide sleeping accommodation and unrestricted liberty permitted; and
(3) House and yard, where a house is provided for sleeping quarters and liberty is restricted by the erection of a run.

Under the intensive system the birds are kept entirely under cover, and are thereby afforded the maximum protection from climatic conditions, ensuring greater stability in production. The health and condition of the birds are readily observed by the farmer. Further, it is possible to thoroughly free the house from excreta at regular intervals.

Under the free range conditions, soil contamination from the excreta of the stock naturally takes place, but owing to the unrestricted range and the feeding on the soil by plant life, soil contamination does not become serious. The birds are, however, exposed to climatic variations, and the egg yield is not as stable as under the intensive system. There is, however, the compensation in the reduced cost of feeding, as birds obtain a good deal of their natural food supply by foraging.

The yard and house system has the disadvantages and none of the advantages of both the intensive and free range systems. The addition of the yard adds to the cost of accommodation. The birds are exposed to climatic conditions as much as they are under the free range system. Egg production is not stable, nor are the birds in a position to gather any of their own food requirements. The most serious disadvantage, however, of this system is soil contamination. A good many of the highly contagious diseases of poultry, and internal parasites, are transmitted from bird to bird through the excreta. Many organisms of the common diseases of the fowl will lie dormant in the soil ready to cause infection on the first favourable opportunity. Although the excreta may be scraped regularly from the surface of the poultry yard, many of the minute organisms and worm eggs are below the surface, and it is only necessary for favourable conditions to arise before infection takes place.

When the house and yard system is adopted, two yards should be erected for each house. This enables one yard to be spelled, planted with some crop suitable for green feed, and the soil thus sweetened.

For the specialist poultry keeper, where large numbers of laying stock are to be kept, the intensive system of housing is most suitable. For the farmer who raises poultry as an adjunct to other rural pursuits, the free range system offers many advantages.

## CARE OF GROWING STOCK.

In the housing of growing stock the pens are only occupied throughout six months of the year, and as egg production does not enter into consideration, the exposure to climatic conditions is not so material. Likewise, soil contamination is not pronounced. To obtain the maximum development, exercise must be provided. The free range system answers admirably for the purpose of the development of growing stock, but as several hundred pullets of different ages have to be reared, it is necessary to erect netting fences for the separation of the various lots. These runs should be made as large as the land will permit, allowing not less than 6 square yards per bird, and the number in any one pen should not exceed one hundred.

## BROODING OF CHICKENS.

There are numerous systems of brooding chickens. The system to be adopted depends largely upon the number to be handled, the personal inclinations of the farmer, and the capital to be expended. The subject of brooding is too extensive for full reference in this bulletin, and farmers are advised that additional information may be obtained from the Department of Agriculture on this subject.

PLATE 67.

A good Poultry House constructed from plans supplied by the Department of Agriculture and Stock. Housing under the intensive system allows 3½ to 4 sq. ft. of floor space for each bird; under the free range system, 2 sq. ft. are sufficient.

## The Cost of Rearing.

It must be pointed out that, however ideal the brooding and rearing conditions are made, without suitable foods being used throughout the growing stage, unthrifty stock will be the result. To arrive at the cost of the chicken, the value of the breeding stock, breeding pens, feed consumed by breeding stock, incubators, fuel, results obtained from incubation, and labour have all to be taken into consideration. These items vary considerably on different farms, but exclusive of labour and the value of stud stock, the cost of a chicken should not exceed 5d.

This cost is arrived at on the following basis:—

| | Rate per Chick. |
|---|---|
| | d. |
| 10 per cent. interest and depreciation on a 1,000 chick-plant valued at £60 | 1·44 |
| Two eggs per chick at 1s. 6d. per dozen (cost based on poultryman using eggs produced by himself) | 3·00 |
| Cost of fuel | ·55 |
| Total | 4·99 |

*Note.*—Proportionate cost of males is not taken into consideration. One male may sire 240 chickens and last two years. The proportionate charge would be ½d. per chick for every £1 value of the bird.

A larger plant and better hatching would reduce this cost; both are feasible.

Assuming that a chicken one day old costs 5d., the cost of rearing to maturity, allowing for mortality and the cost of rearing the male birds, can be determined. Many producers state that the food alone, to produce a pullet, costs 5s. This figure is probably on the high side, and various tables have been prepared from experiments conducted, showing the consumption of food and its cost at prices within the reach of every poultry-raiser:—

TOTAL FOOD CONSUMED IN FORTNIGHTLY PERIODS ACCORDING TO AGE.

| Age. | White Leghorns. | Rhode Island Reds. |
|---|---|---|
| | Lb. | Lb. |
| 2 weeks | ·22 | ·24 |
| 4 weeks | ·79 | ·81 |
| 6 weeks | 1·71 | 1·85 |
| 8 weeks | 3·11 | 3·42 |
| 10 weeks | 4·88 | 5·37 |
| 12 weeks | 6·86 | 7·63 |
| 14 weeks | 8·97 | 9·94 |
| 16 weeks | 11·24 | 12·56 |
| 18 weeks | 13·84 | 15·70 |
| 20 weeks | 16·64 | 18·91 |
| 22 weeks | 19·31 | 22·34 |
| 24 weeks | 22·13 | 25·77 |

Many feeding tests have been conducted, the results of which support the foregoing table, and it is therefore possible to estimate fairly accurately the consumption of food necessary to rear chickens to maturity. A working basis would be from 20 to 25 lb. for Leghorns and light birds generally, and 25 to 30 lb. for the heavy breeds most common to Queensland.

In every batch of chickens there are generally 50 per cent. of cockerels. These birds are sold by many breeders as soon as the sex can be distinguished, while others retain them until greater development has been made. It is questionable if many breeders give consideration to the actual costs of cockerels when they are disposed of, and with the object of guiding breeders, the following table is prepared. The mortality that occurs among chickens is based at 12 per cent. and spread over the first six weeks, as it is considered that losses which occur after this stage are largely due to faulty management. The chickens at the outset are valued at 5d. each, being cost on leaving the incubators.

The total feed consumed per chick is taken from the previous table, and is valued at 14s. per 100 lb. No allowance has been made for labour or interest on plant:—

Cost per Chick allowing for Original Cost when Hatched (5d.), Food Consumption at 14s. per 100 lb., and 12 per cent. Loss during First Six Weeks.

| Age. | Light Breeds. | Heavy Breeds. |
|---|---|---|
| | *s. d.* | *s. d.* |
| 2 weeks .. .. .. .. .. | 0 5·59 | 0 5·62 |
| 4 weeks .. .. .. .. .. | 0 6·77 | 0 6·80 |
| 6 weeks .. .. .. .. .. | 0 8·68 | 0 8·91 |
| 8 weeks .. .. .. .. .. | 0 11·03 | 0 11·54 |
| 10 weeks .. .. .. .. .. | 1 2·00 | 1 2·81 |
| 12 weeks .. .. .. .. .. | 1 5·33 | 1 6·60 |
| 14 weeks .. .. .. .. .. | 1 8·86 | 1 10·48 |
| 16 weeks .. .. .. .. .. | 2 0·67 | 2 2·88 |
| 18 weeks .. .. .. .. .. | 2 5·03 | 2 8·15 |
| 20 weeks .. .. .. .. .. | 2 9·73 | 3 1·54 |
| 22 weeks .. .. .. .. .. | 3 2·21 | 3 7·30 |
| 24 weeks .. .. .. .. .. | 3 6·94 | 4 1·06 |

The marketing of surplus cockerels at the stage most advantageous to the grower has a direct bearing on the cost of pullets. Breeders who market these immediately the sex is determinable (that is, after four weeks old) may obtain from 3d. to 6d. each for the cockerels. From the table it will be seen that the cost to this age has not been recovered. At the same time, the loss is not excessive, nor is it necessary to have an extensive plant which is used only for a few months in the year for rearing cockerels. There is great fluctuation in market values for light

**INCREASE EGG PRODUCTION**

**by**

**breeding from single-tested stock and their progeny.**

breeds such as Leghorns. The table of costs has been compiled for poultrymen who specialise in the industry, to enable them to study market values and dispose of the surplus cockerels to the best advantage. Breeders of birds of heavy varieties will find it profitable to retain the cockerels until they have made good development—say, to the age of twenty weeks—but it is necessary to point out the rapidity with which costs increase. Lower values are also received for birds which have made full sexual development and have become staggy.

The cost of a matured pullet depends upon the policy pursued by the individual. There must be brought into consideration the value received from the sale of cockerels, for with some varieties of stock, cockerels are always reared at a loss, while with breeds of heavy varieties cockerels return a fair profit, exclusive of labour, over costs. The progressive poultry-keeper with the assistance of the table given on page 217 can readily ascertain the costs for himself according to the plan he is following.

## Egg Production.

Poultry-raisers have, independently of breed, two classes of stock from a production point of view—namely, birds during their first year of laying (pullets) and older birds (first and second year hens). The average production that is obtained from either class differs considerably. There is also great variation on different farms between the average production obtained from each section. There are farmers who obtain an average of 200 eggs per bird from some pens of the pullet section of their flocks, while others only obtain 140 to 150 per bird. The production obtained per bird is the final determining factor to success in poultry raising, and farmers should take as their objective an annual average of 200 eggs for pullets.

As an illustration of the variation in production between pullets and hens, the following figures of tests carried out in three successive years may be quoted:—

| | | | | | |
|---|---|---|---|---|---|
| Pullet, average annual egg yield (White Leghorn) | 195·7 | .. | 219 | .. | 208 |
| Hen, average annual egg yield (White Leghorn) | 160·8 | .. | 165·4 | .. | 147·9 |

In these tests only the best first-year producers were retained, otherwise the average production of the hen section would not have been so high. *Therefore only the best of a flock for second or third year production should be retained.*

**INCREASE FLOCK AVERAGE**

**by culling—**

1. **Old hens as they cease to lay;**
2. **Excessively fat hens;**
3. **Birds that show no signs of wear.**

From the above it will be seen that there is an average of approximately four dozen eggs per annum in favour of the pullets over the hens. With eggs at an average price of 1s. 6d. per dozen, and the cost of rearing a pullet at 3s. 6d. to 4s., some breeders may come to the conclusion that when the value of the carcass of the hen is taken into consideration, it would be more profitable to keep only pullets for the purpose of egg production. This is not so, for, to put this theory into practice, a most extensive incubator and rearing plant would be a first essential. Pullets, when about to come into production, are also very susceptible to climatic change and moult. The moult materially reduces the expected egg yield, therefore it is better for the producer to cull the older birds rigidly, and only make the necessary annual replacement to maintain the flock at a specified number.

## Seasonal Fluctuation.

Another important factor is that the average profit per bird is largely influenced by the period of the year during which production takes place. The following table is prepared, showing the relative position of a flock averaging 155 eggs and one averaging 204. These figures are taken from tests which have been conducted during recent years, and are therefore a fair average of the position with respect to the proportionate values of the produce of the hen and pullet sections of flocks:—

| Month. | Average Market Value 1st grade eggs. | Flock Average, 155 Eggs. | | Flock Average, 204 Eggs. | |
|---|---|---|---|---|---|
| | | Production per Hen. | Value. | Production per Hen. | Value. |
| | *s.* *d.* | Eggs. | £ *s.* *d.* | Eggs. | £ *s.* *d.* |
| April .. .. | 2 8 | 5·2 | 0 1 1·86 | 8·9 | 0 1 11·73 |
| May .. .. | 2 8 | 3·8 | 0 0 10·13 | 16·2 | 0 3 7·2 |
| June .. .. | 2 4 | 6·3 | 0 1 2·7 | 16·7 | 0 3 2·96 |
| July .. .. | 1 6 | 12·4 | 0 1 6·6 | 18·4 | 0 2 3·6 |
| August .. .. | 1 4 | 18·3 | 0 2 0·4 | 21·5 | 0 2 4·66 |
| September .. .. | 1 3 | 19·6 | 0 2 0·5 | 21·0 | 0 2 2·25 |
| October .. .. | 1 2 | 20·0 | 0 1 11·33 | 21·5 | 0 2 1·08 |
| November .. .. | 1 4 | 17·9 | 0 1 11·26 | 19·8 | 0 2 2·4 |
| December .. .. | 1 8 | 17·3 | 0 2 4·82 | 17·0 | 0 2 4·3 |
| January .. .. | 1 8 | 12·8 | 0 1 9·33 | 16·4 | 0 2 3·3 |
| February .. .. | 2 3 | 12·3 | 0 2 3·67 | 13·6 | 0 2 6·6 |
| March .. .. | 2 3 | 9·5 | 0 1 9·37 | 13·1 | 0 2 5·47 |
| Totals .. | .. | 155·4 | £1 0 11·97 | 204·1 | £1 9 7·55 |
| | | Average price per dozen, 1s. 7·5d. | | Average price per dozen, 1s. 8·9d. | |

From the table it is observed that heavy-laying flocks are producing freely during the period of the year when prices are highest, while low production is taking place from poor flocks. In the spring period, when prices are invariably low, the poor layer is probably laying equally with the heavy layer, but the latter class of bird scores over the former during all other periods. The prolificacy of the bird, therefore, has a definite money value to the poultry-keeper over and above the value of the actual excess number of eggs produced.

**PARTIAL MOULTS REDUCE EGG YIELD.**

**Do not move pullets after they commence laying, nor make drastic changes in their ration, and so assist in the prevention of partial moults.**

Comparing two farms each having 400 birds, one with good laying stock and the other with birds of medium quality, the position could be set out as follows:—

Gross Income.

400 good birds produce 6,800 doz. eggs at 1s. 8·9d. = £592 3s. 4d.
400 medium birds produce 5,166⅔ doz. eggs at 1s. 7·5d. = £419 15s. 10d.

Taking a dozen eggs as a basis, the average price received from a flock of medium producers as compared with that of a flock of good producers, is not very pronounced, but when it is spread over a period of twelve months on a flock of 400 birds, it grows to the extent of £172 7s. 6d.

PLATE 68.—A PEN OF TYPICAL WHITE LEGHORNS.

### Size of Egg.

This is a most important factor in commercial poultry-raising, and from an industrial and a monetary point of view, the size of the eggs means almost as much to the breeder as numbers. Collectively, if the size of egg is not maintained by producers, it will eventually mean that satisfactory markets cannot be secured for the surplus production. At present it is mainly by export that any surplus can be disposed of, and if this avenue is restricted by the production of undersized eggs, local values will sink to such a level as to make poultry-raising unprofitable. Small or second sized eggs realise throughout the year from 2d. to 5d. per dozen less than the standard 2-oz. eggs. An illustration has already been given, which emphasis the great financial loss sustained from a variation in price of less than 1½d. per dozen on a flock of 400 birds, and from this breeders can readily estimate what a loss of 2d. to 5d. per dozen will amount.

It occasionally happens that a hen laying small eggs produces large numbers. The unsound policy of using the progeny of this hen for breeding purposes has been largely practised. An erroneous impression exists that as the size of egg decreases numbers increase. This is not so. Egg-laying competitions have demonstrated time after time that it is not necessary to employ a layer of small eggs to obtain high production.

Every effort must be made by poultry-raisers to eliminate the hen producing undersized eggs. To do this, never use for breeding purposes hens laying small eggs, and use males which are the progeny of a large-egg hen. It is not sufficient to select the breeders on the question of size of egg when fully matured. A strain of bird should be built up which will commence early in life to produce a standard egg, and it is from that class of bird that poultrymen should select their future breeding stock.

## FARM FACTORS INFLUENCING MARKETING.

The question of marketing has to be considered in relation to—(1) The egg; (2) table birds, including birds specially reared for table purposes, stock that have ceased to be profitable, and young males; and (3) poultry manure.

The latter product is not of great importance at present, as the demand for it is very limited, and in many instances it is found more profitable to use it as a fertiliser for the growing of green feed than to sell it. At the best sales possible, it little more than covers the purchase price of material used for scratching purposes.

Marketing, particularly in the first stage, is most certainly a function which definitely concerns the individual poultry-keeper. It is not merely the task of the Egg Board or the commission agents. The poultry-keeper considerably influences the ease of marketing by the retention of the quality of the egg. If every consideration is not given to the preservation of the quality of the egg as laid, the task of marketing is made most difficult. Producers should therefore remember that the earlier the egg reaches the consumer after being laid the better.

The principal factors influencing successful marketing are—

(1) The production of unfertile eggs.

(2) Clean and ample supply of nests. (Eggs when laid are moist, and dust and other matter readily adhere.)

(3) Gathering at frequent intervals to prevent eggs becoming soiled.

(4) Collecting in clean and dry receptacles.

(5) Storage (pending marketing) on the farm in cool quarters free from draughts and foreign odours.

(6) Regular and frequent despatch to market—twice weekly during warm weather; once weekly during winter.

(7) Using dry, clean fillers, and cases free from moulds when packing for market.

Some eggs are lowered in quality to such a degree, owing to improper care, that they only realise two-thirds of the value of the choicest article. The seriousness of this will readily be recognised. It is a direct financial loss to the producer, while at the same time poor quality eggs seriously restrict consumption. It is not difficult for the farmer to maintain in wholesome condition the product of his birds; *common sense methods of handling and cleanliness are all that are required.*

**Study the production cost of cockerels and market accordingly.**

In the marketing of table poultry, producers must consider three primary features; the grading of stock as to age, as to size, and as to condition.

There is a correct time for marketing stock, whether they are young birds or old. Every day they are kept on the farm after reaching that period is adding to the farm cost. Old hens should be disposed of immediately they cease to lay. This not only reduces feeding costs, but assures the stock being marketed with as few pin feathers as possible, a matter of considerable importance to the poulterer.

Among the numerous hens that a farmer has to dispose of on account of low production, a few will be in poor condition. This class of bird should not be marketed, as its inclusion with other birds lowers the value of the whole consignment. An attempt to fatten such birds usually proves unprofitable, and therefore should not be undertaken. If cockerels are specially reared for market, they should be well grown and in good condition. For market purposes the most economical development and condition are obtained by liberal feeding. In crating the stock that are to be marketed, thought should be given to the comfort of the birds and to the facilities afforded to buyers for inspection. This will ensure that the birds will be as attractive when they reach the markets as when they left the farm, and that the buyer will have the opportunity of definitely ascertaining what he is buying.

## MARKETING STATISTICS.

The Queensland Egg Board, the growers' organisation which was formed under the Primary Products Pools Act, has played an important part in the marketing of eggs during the last five years.

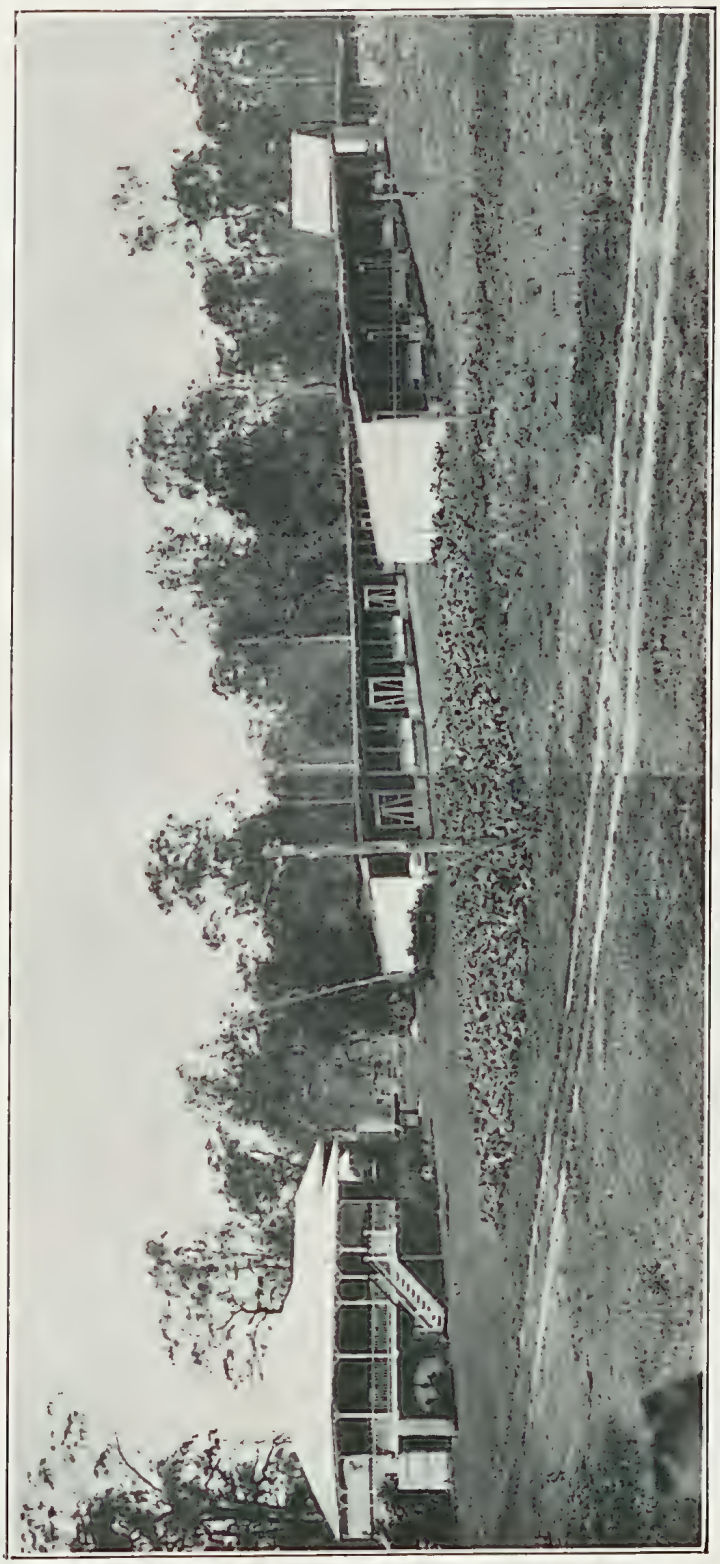

Plate 69.—On a Queensland poultry farm. The intensive system adopted wholly for laying stock.

Since the Board began operations in 1923, a pronounced expansion of the industry has taken place, as the following figures will demonstrate:—

| —— | Quantities of Eggs handled. Dozens. | Exported. Dozens. | Cold Store. Dozens. |
|---|---|---|---|
| 1924 .. .. .. | 932,000 | .. | 77,000 |
| 1925 .. .. .. | 1,041,000 | 12,000 | 94,000 |
| 1926 .. .. .. | 1,736,000 | 189,000 | 120,000 |
| 1927 .. .. .. | 1,865,000 | 236,400 | 103,000 |
| 1928 .. .. .. | 2,747,963 | 823,890 | .. |

The quantity of eggs supplied to the floors of the Board during the current year (1928) shows an increase of 48 per cent. over the 1927 figures, and 195 per cent. when compared with the quantities handled in 1924.

During the week of peak production (24th to 29th September, 1928) supplies were 70 per cent. greater than for the corresponding week of 1927.

These figures demonstrate the rapidity with which the poultry industry of this State has expanded under organised marketing.

**FEED LIBERALLY.**

**The dry mash hopper can be used to ensure liberal feeding—an essential to high egg production.**

Egg production has outstripped the local consumption at present, and producers must make every effort to encourage a greater demand by the careful attention to the quality of the egg, as quality plays the most important part in demand. It is economically unsound to continue to produce eggs in excess of the ability of the market to absorb.

## FEEDING POULTRY.

Because some particular class of food happens to be produced on the farm and has a low market value, it does not necessarily mean that it is profitable to feed it to the fowls. In fact, no one class of food will give the best results. For instance, on many farms maize is produced for the purpose of feeding poultry. This grain is a good poultry food when fed in conjunction with some food rich in protein, such as milk or meat, but by itself will not produce eggs in any quantity, nor will young stock make the desired development when it is the sole source of food supply. The foregoing remarks apply to all foods, and it is therefore important for the subject of feeding to receive attention if poultry are expected to be profitable.

From feeding tests which have been conducted from time to time in various States of the Commonwealth, it is found that birds laying on an average 180 to 200 eggs per annum consume from 90 to 100 lb. of food each. Of the total food consumed by a hen, at least three-fifths goes towards the maintenance of the bodily functions. It has been found

by experiment that a hen may be maintained in perfect physical condition on a given quantity of food, and produce not one egg. This, then, emphasises the necessity for feeding in excess of bodily requirements.

Plate 70.—A Good Type Utility Orpington Cock.

## RETURNS OVER COST OF FOOD.

Experiments indicate that hens 3 to 5 lb. in weight laying approximately 200 eggs consume 90·3 lb. of dry matter per year, and that hens neither laying nor moulting may be maintained in perfect physical condition on a food consumption of 56·94 lb. All food contains moisture, but for the purpose of comparison it is sufficient to estimate the food consumption of a hen laying approximately 200 eggs per year at 100 lb., and to maintain a hen 60 lb. is consumed.

From these figures it will be observed that 40 lb. of food consumed in excess of bodily requirements produce 200 eggs, or for every 4 lb. of food twenty eggs are produced.

Assuming, however, that it takes 5 lb. of food to produce 20 eggs and 50 lb. for maintenance of the bird, the position may be set out as follows:—

TABLE SHOWING RETURNS OVER COST OF FEED OF HENS OF DIFFERENT PRODUCING ABILITY.

| — | 120 Egg Bird. | 140 Egg Bird. | 160 Egg Bird. | 180 Egg Bird. | 200 Egg Bird. |
|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Value of eggs produced at 1s. 6d. per dozen | 0 15 0 | 0 17 6 | 1 0 0 | 1 2 6 | 1 5 0 |
| Less cost of feed at 12s. per 100 lb. | 0 9 7 | 0 10 2 | 0 10 10 | 0 11 5 | 0 12 0 |
| Balance .. .. | 0 5 5 | 0 7 4 | 0 9 2 | 0 11 1 | 0 13 0 |

From the balance must be deducted—

| | £ s. d. |
|---|---|
| (1) The cost of replacement (per bird) .. .. .. | 0 1 3 |
| (2) The proportionate charge of interest on plant .. .. | 0 1 4·2 |
| (3) The proportion of cost of labour (one man caring for 800 fowls at £221 per annum) .. .. .. | 0 5 6·3 |
| Total .. .. .. .. .. | £0 8 1·5 |

These figures conclusively prove that a flock of 800 birds averaging 140 first-grade eggs per annum will not return the commercial poultry farmer the basic wage.

### What Return may be obtained from Poultry?

On some well-conducted poultry farms the average return per bird (all ages) is 10s., after all the food requirements are purchased at the ruling market rates. The poultryman who obtains this average has an efficient plant, gives careful attention to the breeding of his stock, and feeds them to obtain the maximum result.

**Poultrymen desiring information are requested to communicate with the Department of Agriculture.**

To arrive at the net income from any flock, the cost of plant and the cost of the food consumed have to be set against the returns. The minimum cost for the erection of plant, as recommended by the Department of Agriculture, would approximate £35 per 100 head of birds. The value of 100 head of laying stock would be not less than £30. The outlay, exclusive of residence and land, would be £65 per 100 birds.

Interest at 5 per cent. on the outlay and depreciation on the plant at 10 per cent. would total £6 15s. per 100 fowls. Provision has to be made yearly for the replacement of 50 per cent. of the flock, but as an offset against this cost, there is the value of sales from the old birds. This replacement of 50 per cent. of the flock costs approximately £6 5s.

per year. Assuming the average profit over cost of feed per year on a well-conducted farm is 10s. per bird, the position can be set out as follows:—

| | £ |
|---|---|
| Revenue over cost of feed, per 100 birds .. .. .. | 50 |
| Less interest £6 15s., and cost of replacement £6 5s. .. | 13 |
| Net profit per 100 birds .. .. .. | £37 |

From the above it will be seen that a flock of 800 suitable birds is required to secure a return of £296 per annum. However, the control of the costs is in the hands of the breeder. Constant selection, careful

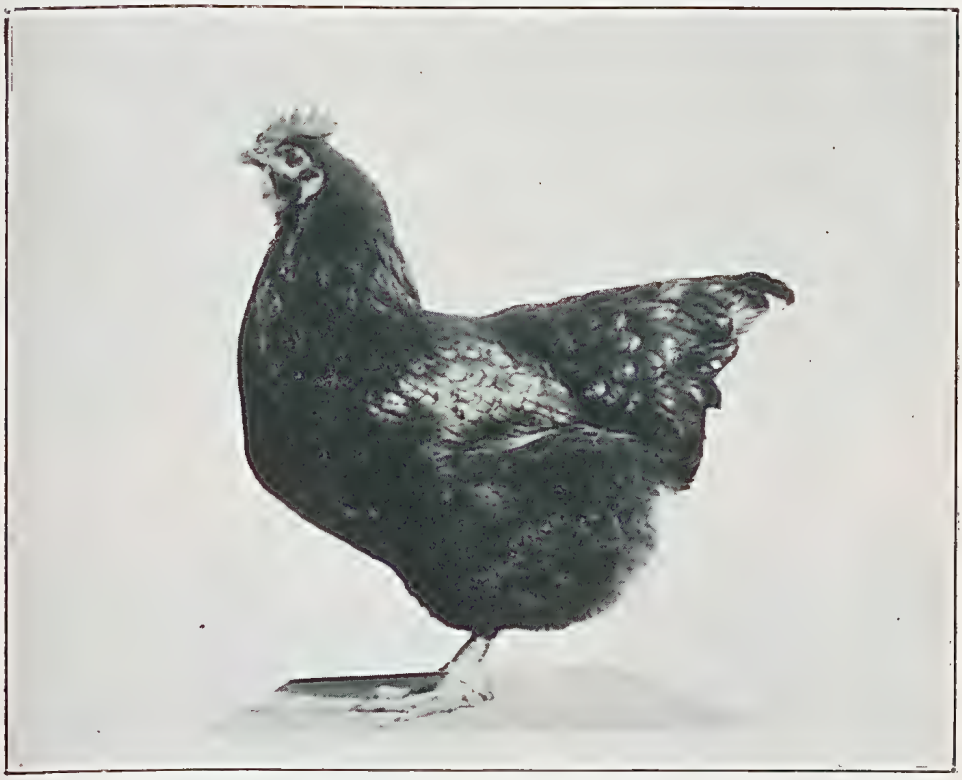

Plate 71.—Utility Orpington Hen—Prize-winner at many Shows.

breeding, and attention to detail are at all times essential. The neglect of any one of these as before shown will have the effect of transposing the abovementioned return into an actual loss.

The dairy farmer, the fruitgrower, and the general agriculturist can obtain returns from his birds equal to that of the specialist by giving his methods of breeding and feeding close attention. It is uneconomic for the farmer to keep a greater number of fowls than he can reasonably care for. It is also uneconomic for the specialist poultry farmer to keep less than 800 laying fowls as otherwise he will not earn the basic wage. Such fowls also must return an annual average production of more than 140 eggs. If the poultry keeper finds it

impossible to hatch chickens at the most suitable period of the year (July to September), it would be much more profitable to purchase day-old chickens from reputable breeders than to rear stock hatched out of season, or which are the progeny of unsuitable breeding birds. Chickens hatched out of season are likely to be unprofitable to the individual and cause economic loss to the industry. Those hatched late in the year are slow in maturing and come into lay during the period of peak production. Those hatched early in the year mature rapidly and moult after a few months' production during the period of high supplies.

## AIDS TO THE POULTRY-KEEPER.

The assistance rendered has taken the form of education, aid in efforts for orderly marketing, and in the procuring of well-bred stock. Instructors are attached to the Department of Agriculture and Stock, whose duty it is to address gatherings, visit farms, and advise farmers on all phases of the industry. Educational articles on various aspects of the industry appear regularly in the "Queensland Agricultural Journal," while bulletins on poultry subjects are issued free of charge on application. By the passing of the Primary Products Pools Act, poultrymen were enabled to establish co-operative marketing.

The provisions made for storage at the Government Cold Stores gives the poultrymen confidence so far as the further expansion of the poultry industry is concerned, as adequate storage is assured.

At the Queensland Agricultural High School and College, Gatton, many of the commercial breeds of poultry are maintained, and stud birds may be purchased at reasonable prices by established poultrymen or beginners in the industry.

PLATE 72.—BRED FROM VIGOROUS STOCK.

# CAPONIZING.

By P. RUMBALL, Poultry Expert.

The question whether caponizing is profitable or otherwise is best left to the individual producer is decide, as the features governing the commercial side of the proposition, that is cost of feeding and ultimate sale, are of a varying nature.

The capon, however, has advantage over the uncaponized bird in weight, quality of flesh, cost of maintenance, &c. The opinion frequently expressed that capons grow to a greater size than cockerels is wrong. When the reproductive organs are removed cockerels lose any fighting instinct and lead a lazy, inactive life, thereby putting on more weight or flesh but not size. It is possible also to retain capons until they

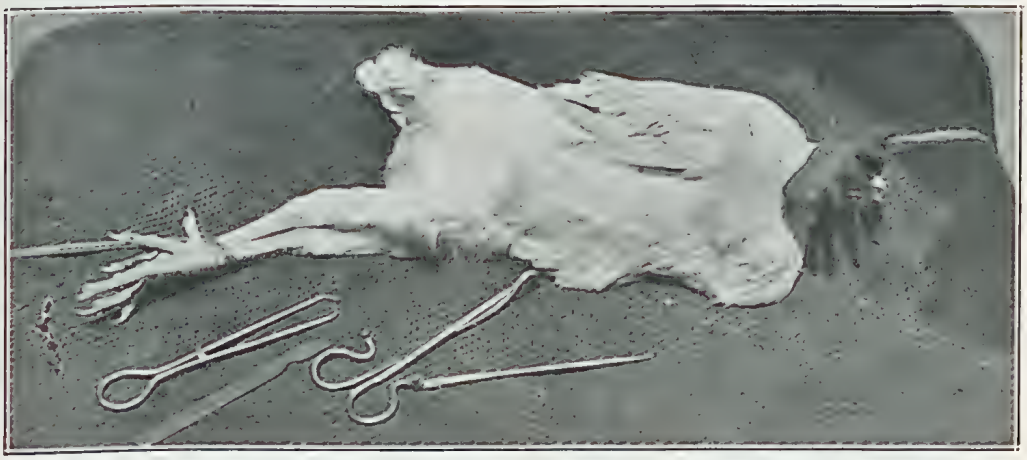

Plate 73 (Fig. 1).—Bird in Position for Caponizing. It can be Turned Over without Unfastening, which Facilitates the Operation.

Plate 74 (Fig. 2).—Clearing the Feathers in Front of Hip Joint and Holding Others Back by Damping.

are fully developed and to market them as desired. This is not so with cockerels, as they become troublesome and lose the quality of flesh. The inactive life a capon leads, naturally reduces food consumption, and so it is kept at greatly reduced

PLATE 75 (Fig. 3).—ASCERTAINING THE CORRECT POSITION FOR OPERATION BY LOCATING THE LAST RIB WITH THE FOREFINGER.

PLATE 76 (Fig. 4).—DRAWING SKIN BACK WITH FOREFINGER AND MAKING INCISION BETWEEN LAST TWO RIBS.

costs, which materially assist a producer in catering for a regular supply of poultry. To the mixed farmer, however, capons should appeal most, inasmuch as they can be allowed to range with the farm flock. There is no necessity of segregating sex, and by being sterile the egg product is in no way injured.

### Appearance of a Capon.

The comb and wattles of a capon do not develop and the head remains small and colourless, having the appearance of unhealthiness. The pointed feathers of the neck and those in front of the tail and large sickle tail feathers grow profusely, and in countries where capons are recognised in their true value as table birds these feathers are left on the bird in dressing and serve as a trade mark.

Plate 77 (Fig. 5).—Insert Spreader, Enlarge Opening and Tear Membrane which Covers Intestines.

### Marketing.

At present the caponizer should cater for regular customers, but if his supply is greater than demand the marketing of the surplus should take place when young birds of quality are scarce, which happens annually from March until early cockerels are on the market—say September. Cockerels of any breed may be caponized, but breeds of the light or small varieties, such as Leghorns, are not as suitable as the larger varieties, such as Orpingtons, &c., although in this article Leghorns have been used for illustration purposes.

The age at which the operation is to be performed naturally varies with development and various breeds, but generally speaking the correct period is between eight and twelve weeks when the chickens are about 2 lb. in weight. The next point which the caponizer must keep in mind is light. A good light (sunlight) is essential, especially to the inexperienced operator. With practice he can operate under indifferent conditions, but for a start the position of the various organs must be

thoroughly understood. The third requirement is to refrain from feeding and watering the bird for at least twenty-four hours—thirty-six would be better. Under such treatment the intestines become empty and will of their own account fall away from the side where the incision is made, and, as well as lessening the chance of injury, permit of the reproductive organs being seen much easier.

**The Operation.**

In addition to knife, spreader, probe, and forceps, a table and two pieces of soft cord with a running noose at one end and two half bricks attached to the other, with a basin containing a weak antiseptic solution, are necessary. The table may be an old packing case or barrel, or the operator may prefer to make a more elaborate and possibly convenient bench. The bird is fastened down by means of the cord and bricks, one noose being placed around its legs, and the other around its wings, close to the body, and the bricks allowed to hang down on either side. The correct position is illustrated in Fig. 1.

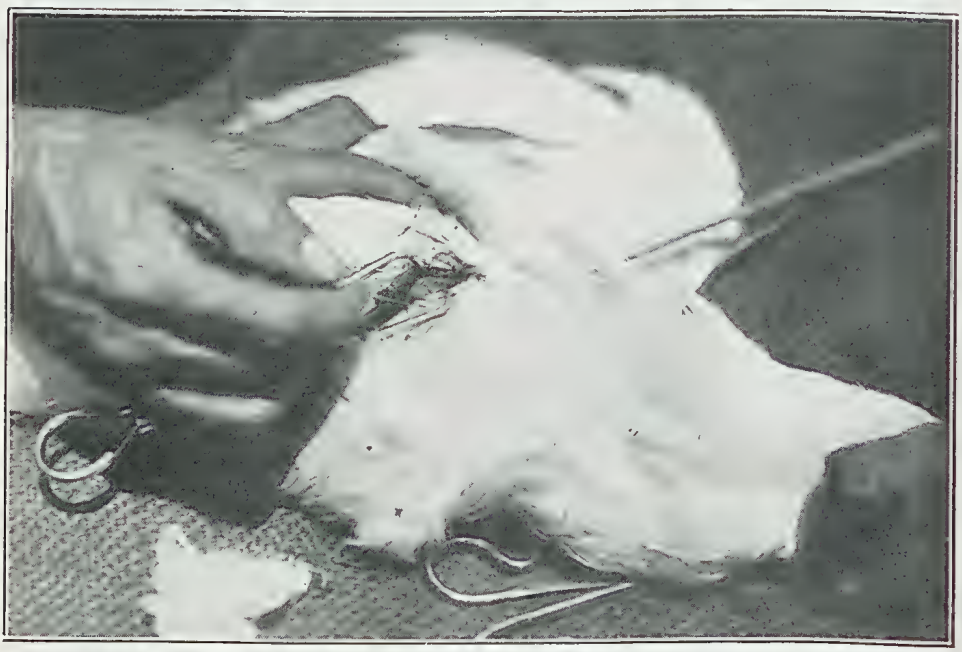

PLATE 78 (Fig. 6).—CLOSE-UP VIEW, SHOWING POSITION OF TESTICLE.

The next move is to pluck a few feathers off the seat of operation, which is just in front of the hip joint. In a bird of the correct age very few feathers will need removing and those that are lying in the way can easily be held aside by damping them with the antiseptic solution which should always be used to cleanse the position to be operated on. The clear space obtained by doing this is illustrated in Fig. 2. Having done this the correct position to make the incision must be ascertained. This is best done by placing the thumb on the hip joint, gradually moving the forefinger along the body until the last rib is felt, as shown in Fig. 3. It is between the two last ribs that the incision has to be made, but before doing that draw the skin as far back as possible with the forefinger as shown (Fig. 4) so that when the operation is completed and the skin goes back to its natural position the wound in the skin and abdominal cavity are not directly opposite. Having made the cut insert spreaders, enlarge opening to about 1½ inches, and gently spread the ribs as shown in Fig. 5.

When this is completed a thin membrane will be noticed covering the intestines. This has to be removed, which is done by means of the probe, as shown in Fig. 5, before the testicle can be seen. The testicle is easily noticed if the bird has been properly starved. It is yellowish-white in colour, runs parallel with the backbone, and in birds of correct age about three-quarters of an inch long and a little thicker

than a plump grain of wheat. The position of this is shown in Fig. 6, although somewhat enlarged due to the advanced age of the bird operated upon. With the forceps take hold of the testicle, being careful not to grasp the large artery which runs parallel with and close to it. Withdraw the instrument, as shown in Fig. 7, with testicle attached with a twisting motion, and after appendages have been twisted up and pulled out, cut them about 1½ to 2 inches from testicle to make certain that no portion of the organ remains.

When the operation is completed on one side turn the bird and repeat the process. Some operate from the one side only, but this method carries more risk, and saving in time is doubtful.

Plate 79 (Fig. 7).—Severing Appendages after Removal of Testicle.

In about a week it is a very difficult matter to find where the incision was made —a few wind puffs are occasionally met with, but they merely need to be pricked.

After the operation of caponizing turn the bird loose. If the operation has been correctly performed the skin covers the wound, and no dressing of any description is required. It is as well, however, to keep the capons in clean quarters and away from untreated birds for a few days, but beyond this other treatment is unnecessary.

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## POISONS IN RELATION TO STOCK.

Reference is made by the Chief Veterinary Surgeon of the New South Wales Department of Agriculture to the extreme carelessness frequently displayed by farmers in connection with poisons. It is well known that arsenic in almost any form and paint seem to have an attraction for cattle, and yet such material as sheep dip, cattle dip, prickly-pear poison, and other deadly poisons are often casually left in such positions that cattle may get at them. If a complete return could be obtained of all the stock in the State which die in a year as a result of this carelessness the figure would probably surprise many.

## DIARRHOEA OR WHITE SCOUR IN YOUNG PIGS.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

The following maxims have been compiled as golden rules for the breeder who wishes to ward off attacks of diarrhœa in his pigs:—

1. Do not overfeed the sow immediately before or after farrowing or during the first ten days she is rearing her litter.

2. Do not feed sour, decomposed, or musty foods, and be careful also to keep musty, mouldy bedding out of the sow's sty.

3. Avoid changing the sow's food while she is suckling her litter unless it is found to be absolutely necessary; then effect the change gradually.

4. The moment any of the young pigs show the slightest sign of diarrhœa (scouring) reduce the sow's food supply by half, and compel her to take liberal exercise, the object being to reduce the quantity of milk she is producing. Some breeders believe that the sow should have one heaped teaspoonful of powdered sulphate of iron dissolved in hot water and placed in her feed; this will do no harm, and certainly would tend to reduce the supply of milk and tone up her system.

It is well to note that when the sow farrows she has an ample supply of milk (or she should have if she is in normal condition) for her progeny, and they soon reduce her normal supply; but some breeders in their enthusiasm and with a desire to give her a good time both before and after farrowing immediately increase her food supply and keep her trough well filled. Under this treatment the sow likewise becomes enthusiastic and produces heavier supplies of milk; consequently the young pigs get more than is good for them or is necessary, and as their digestive organs cannot effectively deal with the extra supply the result is that indigestion is set up, and this is generally accompanied by inflammation of the stomach and intestines. The pigs then sicken and a feverish condition follows; the bowels refuse to act properly, and grey-coloured, evil-smelling, profuse diarrhœa follows. The young pigs do not immediately lose their appetites, but their condition gradually grows worse, and they begin to die off. The owner frequently thinks they are dying of starvation, and continues to force the sow with food so that she will produce more milk. The sow thus becomes overburdened with milk, and as the suckers gradually drop away from her she cannot get rid of it; inflammation of her udders follows and she also sickens, and will probably suffer to such an extent as to lose her supply of milk altogether. This is commonly referred to as milk fever.

It is necessary to remember that the stomach of the young pig is very small and it requires small quantities of food only and at frequent intervals. They are, however, easily overdone and treating them is a difficult matter. To prevent trouble note that the sow should not be fed during the day she farrows; give her a thin gruel only, about eight or ten hours after farrowing, and very gradually increase her food supply after the suckers are born and until they are a week or ten days old. She must have sweet succulent green food and ample exercise, and when the pigs are ten days old they may be allowed to explore their surroundings, and gradually become accustomed to following the sow about. If, after all due care is taken to prevent the appearance of white scour in successive litters, it should occur and not yield readily to treatment, it would be better to seek veterinary aid, for the trouble may be due to infection.

To summarise: Immediately there is any sign of scouring in one or more of the young pigs, reduce the sow's food supply by half; compel her and the suckers to take exercise; give powdered iron in the food as advised; move the sow and suckers to a clean, dry pen, and feed the sow very lightly for a few days. If the ailment persists, give the sow a second dose of medicine (the powdered iron should be dissolved in hot water before being added to the food); give each of the suckers teaspoonful doses of castor oil on the first day, and again next day if still scouring; sprinkle the floors and yards lightly with air-slacked lime and keep them scrupulously clean; add a cupful of lime-water to the sow's food every day, and be careful not only to use sweet clean food, but also to place it in a clean food trough in a clean pen. Later, when the young pigs begin to feed "on their own," give them some lime-water, too; it does them no harm as long as it is not used too freely. The lime-water is readily prepared by taking a tub or barrel, cleaning it out thoroughly, and soaking in clean water for a day or two. Then half-fill with clean rain water and put about half a bucketful of air-slacked lime in the barrel, and after stirring water and lime together, allow to settle for several hours. It will be noticed that a thin "scum" floats on the surface, and that the water is as clear as crystal. As long as this scum forms daily, the lime-water is good; and the barrel can be refilled after use. Stir the lime up occasionally, and it will be good for two or three weeks at

least. When the scum fails to appear on the surface, clean the barrel out, and start again with a fresh supply of lime and water. Never use an iron or tin container for this purpose.

Cleanliness is next to godliness in all matters relating to pig management. Common-sense methods of feeding and care are also golden rules, and a knowledge of the cause and effects of the common diseases to which stock are subject will be of the greatest value at all times.

### Boiled Rice as a Remedy for White Scour.

An American breeder, writing recently on this subject, recommends boiled rice and the water in which the rice has been boiled as a cure for the trouble. This is a very useful remedy; in the case of very young pigs a dessertspoonful of warm rice water two or three times a day will suffice; it must be given in teaspoonful doses as a drench, and the suckers should be kept away from the sow for at least two hours after dosing. Weaners that still have a good appetite should be given both the boiled rice and the rice water, and no other food should be allowed while this is being given.

Further information in connection with this and other diseases of the pig and in connection with pig raising generally may be obtained in pamphlet form from the Department of Agriculture and Stock, Brisbane, at any time.

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## SIZE OF BREEDING PIGS.

L. A. DOWNEY, H.D.A., Instructor in Pig Raising.

On visiting many farms, one is surprised to see the small and inferior quality breeding stock being used to produce bacon pigs.

It is well known that one of the chief aims of the pig raiser is to get his pigs away to the bacon factories as quickly as possible in order to get quick and profitable returns.

The dressed weights for prime bacon pigs at the Queensland factories at present are 95 lb. to 120 lb.; that is approximately 140 lb. to 172 lb. live weight. If the farmer can get his pigs to this weight in five months instead of six months, it is quite evident that he will save one month's feed, labour, and risk on his pigs, and he will also have his returns one month earlier from each bunch of pigs sold.

It is quite possible to get pigs to these specified weights in five months. In fact, some of the prime baconers received at the Queensland factories now are less than five months old.

There are many factors which contribute to quick growth in pigs, the chief of which are:—Good quality breeding stock of large size and strong constitution; healthy and comfortable accommodation for the pigs; an ample supply of food of good variety and quality, together with proper management in breeding, housing, and feeding.

The point which seems to be most neglected on Queensland farms is the size of the breeding stock, both boars and sows. All other factors being equal, a small sow cannot be expected to rear such large and fast-growing pigs as a larger sow, although she may be just as prolific. Size will also be transmitted to the offspring by the boar. Therefore, if the farmer wishes to get the best results from his pigs, it is his duty to look to the breeders.

It seems quite a common practice of many farmers to mate their breeding sows when five or six months old; this practice alone is quite enough to spoil the chance of getting the best from their pigs.

The age at which to mate a sow will depend mainly upon her growth, but generally about nine or ten months is the best age, for a sow of this age is generally well developed and will grow into a large roomy sow.

The breeding age is not the only controlling factor in the size of the pigs, but the sow should be well fed while she is pregnant and while she is suckling her litter, for it must be remembered that at this stage she has to grow herself as well as feed her young.

The best age to breed from a boar is about the same as that of a sow, viz., nine to ten months, and the boar must be used carefully, only allowing him four or five services for the first six months.

The extra expense of keeping a sow on from six to ten months of age before mating her is negligible compared with the difference it will make in her offspring; this will be quite evident when it is remembered that a sow will rear approximately fourteen pigs per year for about six years, and all her pigs will be affected by her size.

It is sometimes argued that a particular sow which is very small is an exceptionally good breeder and good doer; in answer to that, it may be said that if that particular sow had all her present qualities with extra size she would be even a better pig.

It behoves the pig raiser to consider this important point and cull those small sows and boars which are all too common and replace them with well-bred pigs which have quality as well as size.

It must be borne in mind that early maturity is not everything in our bacon pigs. Other points to be considered in the ideal bacon pig are:—Weight, length and depth of body, good ham development, light development in the shoulder and jowl, fineness of bone, and firmness of meat, with a predominance of lean over fat.

## INDIGESTION IN CALVES—SOME COMMON CAUSES.

Owing to the artificial manner in which most calves in dairying districts are reared, indigestion and its consequences—general unthriftiness, diarrhœa, and stunted growth—are very common. These troubles may be due to any one or combination of the following causes:—

Overloading the young animal's stomach through endeavouring to give sufficient nourishment to cause it to thrive in too few feeds.

Replacing full milk with skim milk or milk substitutes too early or too suddenly.

Giving the feed cold or only slightly warmed instead of at the normal temperature of milk fresh from the cow.

Sudden changes of food, as from skim milk to substitutes, and back again.

So feeding a bunch of calves that the little animals gulp it down as quickly as possible to prevent others from getting it.

Giving such a small ration that the calves are driven to eating rough forage and hay, &c., at a too early age.

In order to prevent disease in calves from improper feeding the following points require attention:—

Cleanliness in feeding, which should preferably be from metal receptacles which can be scalded out.

Separate feeding of the calves to ensure that each one gets a fair feed and is not unduly hurried.

Feeding the milk and other material at blood heat.

The gradual substitution of skim milk for whole milk, and the replacing of the nutritive material thus lost by meal obtained from cereals or other concentrated food.

Regularity in times of feeding and quantity of material used.

Gradual change of food when necessary, and gradual weaning.

The skim milk which is used should be as fresh as possible, since the longer it is kept the more likely it is to be contaminated and so cause diarrhœa. The skim milk, buttermilk, and whey obtained from creameries and factories is particularly dangerous, since the feeder has no control over the possible contamination of the material. It should be pasteurised before being used.

## DINGO TRAPPING—AN EFFECTIVE LURE.

Mr. G. Herbert Merriman (Mount Lindesay) writes:—I was interested in your article on "The Dingo" in your February edition re trapping and decoying. The most successful trapper I ever met was on Galway Downs, west of the Cooper. He would get from ten to twelve dogs a night and his method was simple. He had a black dog which he had trained from a pup and he used to tie a tin on to the dog and the dog used to make water in this tin; he would then pour the urine into a large bottle with dogs' excreta, and would sprinkle a little of this where the trap was set, and I do not think he ever missed. He called the mixture "Raeus mirabillis," and I consider the name was fully justified, for he uncorked the mixture to show me one day; this was over twenty years ago and I haven't forgotten the perfume yet—and never shall. He had got over 300 dogs in the district then, he told me, and was shortly to leave for a spell. I have come across many dog trappers in my travels in the West, but I would certainly give the award to this one.

## ADJUSTING PLOUGH DRAFT.

The accompanying diagram, illustrating some of the principles of adjusting plough draft, is well worth reproducing from a recently published leaflet of the John Deere Company.

In operating your walking plough, see that the hitch is right and the share has the proper "suck" to ensure penetration.

Drawing No. 1 illustrates the result of a too-short hitch. The "heavy-line horse" is hitched correctly—the plough running at an even depth. The dotted line represents the same horse hitched closer to the plough. Note that the line of draft has been changed, as shown by the dotted line. This naturally pulls up on the plough beam and raises the plough point to such an extent that the bottom may be lifted entirely out of the ground or not run the desired depth. In this case the clevis should be raised.

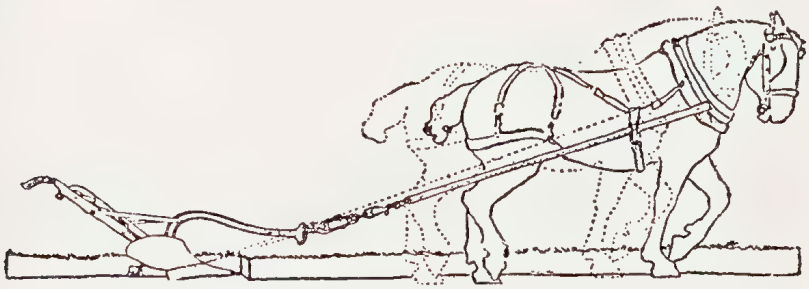

Fig. 1—Effect of too short a hitch.

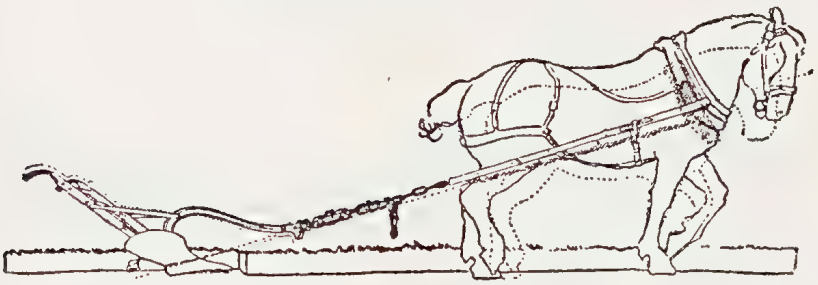

Fig. 2—Effect of small horses.

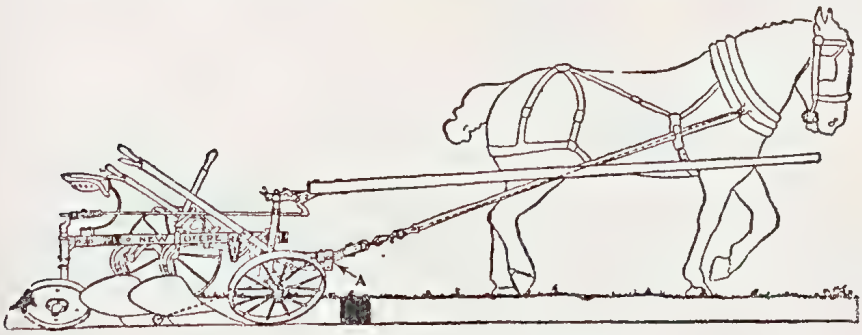

Fig. 3—Proper hitch for riding plough.

Too-long tugs will have an opposite effect. In this case the direct line of draft will be lowered proportionately to the length of the tugs, and the tendency will be for the plough beam to be pulled down. The result is a too-deep furrow. Lowering the clevis will remedy this condition.

Drawing No. 2 shows how horses of different size affect the work of the plough. The solid lines show the correct hitch. The dotted lines show the effect of a smaller horse with no change made in length of tugs. The line of draft is lowered at the horse's shoulder, as shown by dotted line, and there is a pulling down at the beam point. This makes the plough run deeper. Lowering the clevis will remedy this. Shortening the tugs also will correct the trouble.

A larger horse than the one shown by the solid line would have the opposite effect—there would be a tendency to pull the plough out of the ground—make it run too shallow or unevenly. Either lengthening the tugs or raising the clevis would correct this condition.

In addition to the preceding conditions that affect the running of the plough, very often the tugs are held up in the hip loops, thereby causing an uplift. Remove tugs from hip loops.

Attention to these matters will save trouble and will assure a good job of ploughing.

Getting the correct hitch is the most important adjustment on a plough. Be sure to read carefully the following instructions on hitching to a gang plough:—

### Vertical Hitch Adjustment.

This refers to the up-and-down adjustment on the vertical clevis. (See "A" in illustration above.)

The correct hitch at "A" is the place where "A" is in a true line between circle on plough and point of hitch at the hame.

When ploughing deep or using tall horses, hitch higher at "A" than when ploughing shallow or using small horses.

When hitching horse strung out, hitch lower at "A" than when using four horses abreast.

Remember, if you hitch too high at "A," there is a down pull on the front end of the plough, and the rear end of plough will tend to come up.

If you hitch too low at "A," the draft will tend to lift the front end of the plough.

By changing the position of the clevis up or down, one or two holes at "A," a trial will generally show which hole places the clevis in a true line of draft.

### Horizontal Hitch Adjustment.

Hitches are adjustable horizontally for the purpose of accommodating the position of the horses and the various sizes and types of eveners. Therefore, the cross-hitch is very long and has a large number of hitch positions.

Move the clevis to right or left on the horizontal bar until furrow horse is accommodated. If hitched too far to left, plough will not take enough land; if too far to the right, plough will take too much land. Correct by changing hitch a little.

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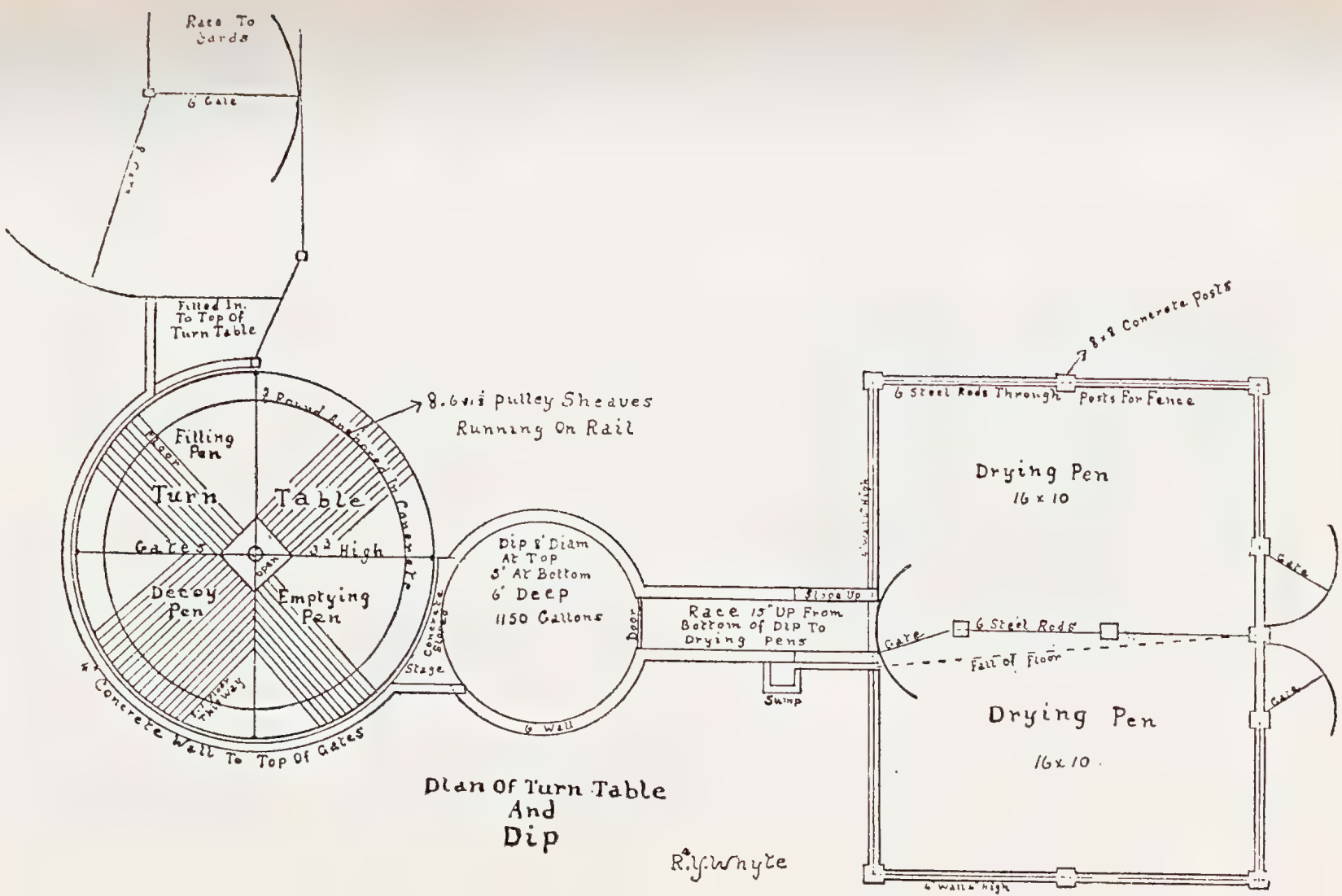
## DIPPING MADE EASY.

Many and varied are the devices for dipping sheep in operation, but surely the most novel idea yet tried out is one recently constructed for Messrs. Henderson Bros., Otapiri, Southland, New Zealand. Henderson Bros., in engaging a contractor to put in an up-to-date dip, gave him an idea of what they wanted in the way of drying pens, dips, yards, &c., and also suggested placing a circular pen between the dip and the race. This circular pen was to have a centre post with swinging gates that could be pushed round behind a few sheep, thus forcing them to a handy position opposite the dip. The builder at once saw the possibilities of the turn-table idea, and on suggesting it to Messrs. Henderson Bros. had it accepted without delay. The work then went ahead on the new idea, and resulted in the erection of what must be the most efficient outfit of its kind in Southland to-day.

### Some Details.

Of course, the chief novelty is the turntable, which, as will be seen from the accompanying sketch plan, is placed between the race and the dip. The turntable consists of a wooden platform set on a suitable number of pulley sheaves which runs on a rail anchored in a band of concrete 6 in. wide under the table. The top of the turntable is divided into four compartments by means of fixed gates or hurdles, which are filled with sheep in rotation. When the first compartment filled is in position opposite the dip No. 3 pen is at the filling point and No. 2, already filled, is between the two; this goes on continuously, there being a "decoy" pen always




Plan Of Turn Table And Dip

R. J. Whyte

between the filling and emptying points. A concrete wall as high as the gates partially surrounds the turntable and so completes the enclosure as each compartment swings round. Each compartment will take ten or twelve sheep at one time without difficulty.

The advantages claimed for the invention are:—

1. The turntable does away with the hard work of forcing the sheep into the dip.
2. The decoy pen acts as an inducement for incoming sheep, making the task of loading a comparatively easy one.
3. A saving in manual labour, reducing dipping to two or three men instead of four to six.
4. Of great assistance in dipping valuable stud sheep or old ewes.

Since its completion Messrs. Henderson Bros.' dip has been a great source of interest to farmers from far and near, and one and all have expressed their appreciation of the idea. With the exception of the turntable and gates, the entire outfit is erected in concrete and steel, and looks as though it would last for a hundred years.—"New Zealand Farmer and Stock and Station Journal."

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY, 1928, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING January, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Jan. | No. of Years' Records. | Jan., 1929. | Jan., 1928. | | Jan. | No. of Years' Records. | Jan., 1929. | Jan., 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | In. | | In. | In. |
| Atherton ... ... | 11·59 | 27 | 17·03 | 7 73 | Nambour ... ... | 9·98 | 32 | 9·46 | 8 21 |
| Cairns ... ... | 16·23 | 46 | 26·99 | 5·84 | Nanango ... ... | 4·66 | 46 | 9·51 | 4·33 |
| Cardwell ... ... | 16·45 | 56 | 28·01 | 5·18 | Rockhampton ... | 8·57 | 41 | 3·89 | 3·40 |
| Cooktown ... ... | 14·25 | 52 | 24·27 | 2·08 | Woodford ... | 7·89 | 41 | 13·22 | 5·19 |
| Herberton ... ... | 9·61 | 41 | 14·40 | 5·31 | | | | | |
| Ingham ... ... | 15·76 | 36 | 31·09 | 7·29 | | | | | |
| Innisfail ... ... | 19 81 | 47 | 35·58 | 14·80 | *Darling Downs.* | | | | |
| Mossman ... ... | 14 08 | 15 | 36·38 | 8·81 | | | | | |
| Townsville ... ... | 11·27 | 57 | 15·96 | 7·93 | Dalby ... ... | 3·38 | 58 | 1·81 | 0·86 |
| | | | | | Emu Vale ... | 3·35 | 32 | 2·48 | 2·90 |
| | | | | | Jimbour ... ... | 3·75 | 40 | 1·53 | 1·49 |
| *Central Coast.* | | | | | Miles ... ... | 5·90 | 43 | 1·28 | 1·46 |
| | | | | | Stanthorpe ... | 3 64 | 55 | 1·73 | 3 95 |
| Ayr ... ... ... | 11·28 | 41 | 25·38 | 3·82 | Toowoomba ... | 5·05 | 56 | 5·00 | 4·15 |
| Bowen ... ... | 9·90 | 57 | 33·32 | 4·38 | Warwick ... ... | 3·61 | 63 | 2·43 | 2·96 |
| Charters Towers ... | 5·68 | 46 | 3·15 | 1 54 | | | | | |
| Mackay ... ... | 14·35 | 57 | 16 61 | 4·41 | | | | | |
| Proserpine ... ... | 15·55 | 25 | 39·62 | 7·31 | | | | | |
| St. Lawrence ... | 9·67 | 57 | 8·14 | 8·64 | *Maranoa.* | | | | |
| | | | | | Roma ... ... | 3·33 | 54 | 1·24 | 1·79 |
| *South Coast.* | | | | | | | | | |
| Biggenden ... .. | 5·41 | 29 | 5·65 | 4·04 | | | | | |
| Bundaberg ... ... | 9·30 | 45 | 4·21 | 2·77 | *State Farms, &c.* | | | | |
| Brisbane ... ... | 6·47 | 78 | 4·60 | 6·15 | | | | | |
| Caboolture ... ... | 7·84 | 41 | 6·62 | 6·33 | Bungeworgorai ... | 2·14 | 14 | 0·80 | 0·92 |
| Childers ... ... | 7·96 | 33 | 6·37 | 4·45 | Gatton College ... | 4·22 | 29 | 2·46 | 3 52 |
| Crohamhurst ... | 12·81 | 35 | 12·37 | 10·59 | Gindie ... ... | 3·80 | 29 | 1·30 | 4·34 |
| Esk ... ... .. | 5·76 | 41 | 10·74 | 4·53 | Hermitage ... | 3·32 | 22 | 3·23 | 3·18 |
| Gayndah ... ... | 4·64 | 57 | 10·53 | 3·25 | Kairi ... ... | 7 96 | 14 | 21·97 | 4·33 |
| Gympie ... ... | 6·76 | 58 | 9·34 | 3·50 | Sugar Experiment Station, Mackay | 14·63 | 31 | 16·33 | 3·48 |
| Kilkivan ... ... | 5·48 | 49 | 13·43 | 5·65 | Warren ... ... | 5·56 | 14 | 0 44 | 2·74 |
| Maryborough ... | 7·62 | 56 | 4·18 | 6·41 | | | | | |

GEORGE E. BOND,
Divisional Meteorologist.

20th February, 1929.

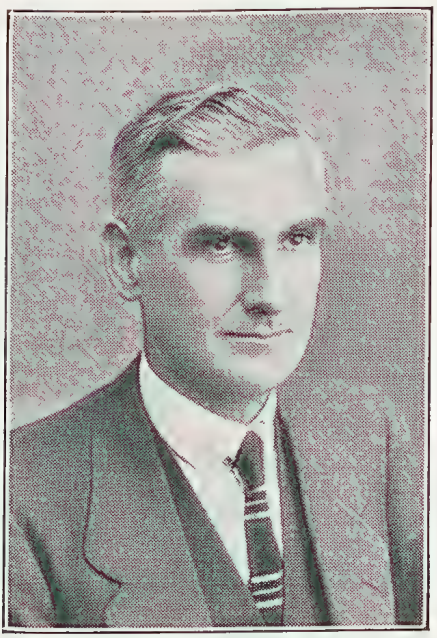


Plate 80.—Mr. Wilfred L. Osborne,
A well-known South Burnett farmer, who has been associated with every forward movement in that rich and progressive district.

In 1907, while still a lad in his teens, he took up land near Murgon, and has since then pioneered seven farms in virgin scrub country, developing each one from a wilderness up to the point of efficient, profitable, and continuous production. A rural economist, trained in the best and hardest of schools, and an earnest and tireless fighter for farmers' rights, Mr. Osborne has been at the front in every move for the betterment of the agricultural industry, and the farmers' organisations in the South Burnett have benefited greatly through his energetic and successful advocacy of their aims.

On the inauguration of the Queensland Producers' Association in 1923 he was elected to the first South Burnett District Council, and in two later elections under the ward system he was returned unopposed as representative of the Local Producers' Associations of the Murgon district, in co-operative matters one of the foremost districts in Queensland. Mr. Osborne has also served on the Murgon Shire Council, as District Secretary of South Burnett L.P.A.s, and as District Delegate to the State Conference of Primary Producers, and the Council of Agriculture.

As an advocate of the pooling system of maize marketing and complete rural organisation Mr. Osborne is regarded as one of the foremost of our farm leaders.

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## NEW SERIES OF HORSE AND CATTLE BRANDS.

The Brands Branch of this Department advises that horse and cattle brands from a new series are now being issued. The brands are composed of two block-type letters similar to those issued in the first series and a design. The four designs included in the series are ⌐ ⅄ ∩ ▽ ; and for purposes of identification are referred to as the "Cranking handle," "Spur or rowlock," "Tent," and "Triangle."

The "G" series of brands, which has just been exhausted, contains similar shaped letters and numerals, but in that series the designs are "Diamond," "Heart," "Spade," and "Cross."

Both the "G" and "H" series (the new one) contain 12,096 brands, and up to the end of February, 1929, over 80,150 three-piece brands had been registered in Queensland since the first brand, CA1, was issued in the name of the Hon. Louis Hope, Kilcoy, on the 1st May, 1872.

## INTERSTATE BUTTER TRADE.

At a meeting of representatives of the Sydney butter distributing houses it was decided that all the members present would, for a period of three months, or until the plan for the control of interstate trade had been formulated, refrain from sending butter to Queensland from New South Wales.

The meeting was sponsored by the New South Wales Butter and Cheese Exporters' Association, and its president (Mr. A. C. McCartney) presided. The chairman said that the meeting had been called to confer with the chairman of the Queensland Butter Board (Mr. J. Purcell), who had already met the trade in Melbourne.

Mr. Purcell said that his board thought that if the interstate trade in butter could be controlled it would be in the interests of the whole industry. They had decided, therefore, as a board, to stop the flow of butter out of Queensland into other States until such times as a shortage occurred in the supply in a neighbouring State. Mr. Purcell referred to the present wasteful methods in Melbourne. He saw two vessels

PLATE 81.—MR. JAMES PURCELL,
Chairman of the Queensland Butter Board.

lying almost side by side, one of which was discharging 2,000 boxes of Queensland butter for Victorian interests, while the other was loading Victorian butter, practically the same quantity, and this was being shipped to Brisbane. Such handling of a perishable article, he said simply meant that producers had to pay an unnecessary cost for the double transfer of the commodity.

Consideration was given by the meeting to the West Australian trade, which required about 3,000 boxes a week. It was stated that the question of a basic price had been arranged at the Melbourne meeting, and that it was understood that Western Australia would find that future shipments would arrive there at the same rate from the Eastern States.

In reply to a question whether it had been agreed that Victoria should not send butter into New South Wales, Mr. Purcell said that he took it that the agreement applied to Victoria, New South Wales, and Queensland.

# FAT LAMBS.

## THE TYPE OF EWE TO BREED FROM.

When considering the type of ewe from which to breed fat lambs, several aspects of the case must be considered, and perhaps the most important of these is availability. Because of the greater numbers bred (writes the Sheep and Wool Expert of the N.S.W. Department of Agriculture) it is always possible to buy Merino ewes, but the same cannot be said of comeback and crossbred ewes, good even lines of which are often very hard to obtain. This fact must be borne in mind when considering the purchase of ewes for lamb-raising, and it indicates that, whether suitable or not, in numerous cases the Merino ewe will be used because other types of ewe are not available. As a mother for the production of a first-class export lamb under average conditions, the pure Merino ewe cannot be regarded as entirely satisfactory. Merino ewes mature slowly, and, compared with the crossbred ewes, do not give high lambing percentages; they are not good mothers, have a smaller supply of milk, and when mated with British breed rams experience more difficulty in lambing—all of which are important points in the production of fat lambs. The ideal ewe is a big-framed, roomy, early maturing type with a good milk supply, giving a high percentage of lambs and looking after the lambs properly.

Experience has shown that the lamb from the Merino ewe by one or other of the longwool breeds does not altogether come up to the requirements of the export lamb trade at the weaning stage. The lambs dress on the light side (25 to 28 lb.) and are rather slab-sided and leggy, and generally are not as compact and symmetrical as is desired. When the Merino ewe is mated direct to a ram of one of the Down breeds the resulting lamb is still less satisfactory, there seeming to be such a great difference between the two breeds that they do not nick well, and the result is unevenness, both in the individual and in the group of lambs; besides this, the lambs are slow in maturing. The results with the Dorset Horn (especially in the hotter districts and where big-framed ewes are used) have been much better than those obtained with the black-faced breeds.

Despite the disabilities mentioned, the fact remains that often Merino ewes are the only ones obtainable, and in such a case big-framed, plain-bodied ewes should be selected, and the best results will usually be obtained by joining with them rams of one of the longwool breeds.

The breeding propensities of the ewe must also be considered. In the hotter districts an early mating is desirable so that the lambs can be sold before the grass seeds begin to be troublesome in the spring. It has been found that crossbred ewes will not mate readily in the early part of the summer or during the hotter months in those districts where an early mating is desired, and this is specially noticeable when the ewes have been procured from a cooler district. An endeavour should be made to secure ewes bred under similar conditions to those where they are to be run, but in certain districts the crossbred is unsuitable for the above reason. Comeback ewes will breed more readily than crossbreds, while the Merino will breed almost at any time; and, considering the fact that Merinos can always be procured, it can be assumed that Merino ewes will be used in greater numbers in the production of fat lambs, despite the disabilities under which they labour, as compared with the crossbred ewe, and the farmer who has to use them will be able to set off against the greater value of the lamb from the crossbred ewe the advantage of this earlier mating—the early dropped lambs which are obtained with the Merino.

The added value of the fleece of the Merino ewe will also help to balance the scales, although it has to be remembered that when run continuously on cultivation ground, the wool of the Merino depreciates to a greater extent than the wool of crossbreds under like conditions.

Under average conditions it must be granted that the best fat lamb is produced by mating one of the Down breeds with a first cross longwool-Merino ewe, and to secure the early maturing lamb desired, the best combination of breeds has been found to be the Dorset Horn ram mated with the Border Leicester x Merino ewe. The Ryeland is also showing great promise when mated with a first cross longwool x Merino ewe, but is only recommended for use in the cooler districts, or where mating does not take place early in the summer.

As mentioned previously, it is not always possible to secure the exact type of ewe required, but an endeavour should be made to get an even flock. Comeback ewes will give a more valuable fleece than the crossbred, but being nearer to the Merino and smaller in frame will not give such an early maturing lamb. The lambing percentage from comeback ewes will not be so good as from crossbred ewes.

# CO-OPERATION.

## ROMANCE OF THE ROCHDALE MOVEMENT.

"Surrounding the performance of the many little services so necessary to fill the wants of even the smallest community is a tremendous waste in money and effort. In the larger towns this is particularly noticeable. The further outback one travels the less this interdependence applies, but there is a corresponding loss of leisure time, or restriction in these services. Again, two-thirds of the farmer's income is spent in providing himself with implements, plant, seed, and the little comforts of life. Of what use is it to double the price of butter if the money gained from this source is wholly lost or dissipated in buying the necessities of living?"

In an address of which the foregoing was substantially the text, Mr. R. J. Grierson, manager of the Co-operative Wholesale Society, Newcastle (N.S.W.), urged upon a recent gathering of North Coast farmers the formation of co-operative community centres, and incidentally gave an interesting account of the origin and growth of the Rochdale consumers' movement. The movement was born at Rochdale, Lancashire, in what had been called the "hungry forties," conceived of dire necessity, when most of the population were struggling under an insupportable load of poverty. It had since been adopted by almost every nation in the world without modification, and had proved worthy to be ranked as one of the great world-wide social movements.

### A Romance of Commerce.

The history of the movement was one of the most fascinating stories in the world. In 1844 a little band of twenty-eight Rochdale weavers met together to discuss (in their words) a way out of their misery. Their idea was to formulate a plan for a better existence. It was easy to devise a plan, but how to put it into practical operation was quite a different story. Among the many suggestions offered only one seemed practicable. This was to open a store, the profits of such to be returned to the people, less an amount to be retained for education.

According to the original plan it was decided that operations be commenced with a grocery store, the capital to be subscribed in shares of £1 each; that interest paid on this capital should not exceed the legal rate; that the shares should always remain at par; that the control of the business should be democratic—that is, one man one vote, regardless of shareholdings, and the voting to be done in person, never by proxy; and, lastly, that the selling price of goods to members should be at current market rates, and all sales for cash, but—and herein lay the distinctive feature which marked the co-operative from the privately owned store—the margin between wholesale and retail prices, commonly called profits, was to be returned to the consumers in proportion to the purchases, and 2½ per cent. of these profits were to be devoted to education. It was on record that a journey of 20 miles was required to gather the initial contribution of 2d. per member, and this task was undertaken in turns by the original pioneers. Out of this small weekly sum of 4s. 8d. had grown the British Co-operative Bank with its present turnover of £520,000,000 per annum.

### A Start in a Small Way.

The store was commenced in such a humble way that the original stock only covered four items—namely, flour, sugar, butter, and oatmeal—and so embarrassed with their small beginnings were these men that it took a lot of courage to take down the shutters and open the shop. The story ran that the shop was opened amid the jeers and catcalls of the population of Toad lane. Although it took a year to raise £28, the pioneers were not daunted, for their community store was to be only the initial step to bring about equity in industry, and to these enthusiasts the store was not an end, but merely the means towards securing the pecuniary benefit and improvement of the social and democratic conditions of its members. So enthusiastic did they become that further objects were included in the plan, as being preparatory steps to the final one, which was no less than this—that as soon as practicable the society should proceed to arrange the powers of production, distribution, and exchange, and that the opportunity be created to allow of unrestricted co-operation on the part of all the members for every purpose of social life.

### An International Organisation.

Few people grasped the immensity of the vision displayed in formulating the above plan, observed the speaker, for out of that effort had grown in Great Britain an organisation with a membership exceeding five and a-quarter million householders, amounting to one-third of the population. In 1926 the capital invested was £100,000,000, the sales were £185,000,000, while 210,000 persons, earning £19,000,000, were employed. And it was notable that the idealism of the foundation members had not been lost, inasmuch that in the year referred to over £180,000 was spent in education.

The enormous growth of the movement was well illustrated by the magnitude of its present operations. The British National Wholesale owned the largest boot factory in the world, it operated the largest textile mills, and its eight great flour-mills were the largest takers of Canadian and Russian wheat, while last year it absorbed and financed the whole wheat pool of Western Australia. It owned 35,000 acres of tea plantations in Ceylon and 33,000 acres of farm lands in Canada; it owned collieries and steamships, and had vast tracts of palm nut groves in Sierra Leone for the production of oil nuts for soapmaking. Such had been the international development of the movement that no less than 50,000,000 householders in thirty-two countries had been registered as active adherents to the principle, and a recent development had been the formation of an International Wholesale, having for its object the transfer of co-operative production through co-operative channels from one country to another.

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## THE SIXTH TRACTOR SCHOOL AT GATTON COLLEGE.

The Queensland Agricultural High School and College, in conjunction with the Council of Agriculture, will hold the Sixth Queensland Tractor School from the 24th March to the 5th April, inclusive. The course will cover lectures, demonstrations, and practical work in the care, adjustment, repairs, and driving of many makes of tractors.

At the last school there were in use Fordson ('tween wheels plough), Fordson (with rotary cultivator), Fordson (crawler), Advance (crude oil), Hart Parr (two), Case, Massey-Wallis, McCormick-Deering, Cletrac, Caterpillar, Cletrac (College owned), British Wallis (College owned), Fordson (College owned). It is expected that other tractors also will be represented this year.

The cost to each farmer will be £3 9s. 6d., which will cover all instruction costs, board and residence, and recreation fee.

The Railway Department will grant attending farmers one-half excursion rates each way on presentation of a certificate from the College.

The College will provide power kerosene, the railage on tractors from and to Brisbane, and free board and residence for tractor mechanics.

Farmers should book to College station and ask the guard to stop, previously advising the College of the train by which they will travel.

Farmers will need to bring blankets, sheets, mosquito net, pillowslips, towels, soap, mirror, and other toilet requisites.

No farmer will be allowed to confine his attention to a particular tractor, but must work each in turn. Should he desire more work on a particular tractor, he will have to arrange it in his spare time.

Applications from farmers wishing to attend the school will be received from now onwards; early applications will be given preference. Any further particulars will be supplied on request.

*A VALUABLE JOURNAL.*

*A Yamsion reader (enclosing a year's subscription to the Journal for a neighbour) writes (31st January, 1929):—"For myself, I can only say that it is a very valuable publication."*

# THE CULT OF THE COLT.*

By "U 9 L."

VI.

## EDUCATION.

Some fault may be found that so far our colts have behaved themselves on conventional lines. They have, and the reason is that we deal with the majority first. We'll handle a snorter or two later, and now we will go on with the orthodox. We have gone through all the primary lessons of a colt's education, building a foundation for his knowledge, and, roughly, that is repeated over and over again. Specially does the tying up devolve into a lesson which is boring in its irksomeness. While we have any batch of youngsters in hand, as soon as they come to the yard in the morning, it is the same old routine with but little variation: catch him, rub him down, have a yarn with him, slip the halter on him and tie him to a stout post or tree. There that little fellow has got to stay, resting alternate legs and swishing the flies till there's no doubt he is heartily sick of the whole course. He may be tied for five hours just to prove to him in a momentary check that he has got to stay put when and where we leave him. That is the whole object of those hours of weary monotony. He cannot take any part of his education in tabloid form, and there are no short cuts to knowledge for him. He has to go through with it. But in gaps of time in between we teach other little lessons.

### Leading—Building up the Colt's Confidence.

Of course, the colt has to learn to follow where we choose to lead. Honestly, there's nothing more gratifying than having a horse which goes without hesitation where you see fit to give it a lead. And if you want to add a few frills for your own pleasure, this is the period when we kill the time which drags. Let's teach a youngster or two to which we've taken a particular fancy to lead without reins. We have taught him to come to us when called, and on that same foundation we educate him to follow where we go. It's easy. I have always found a snap of the fingers impresses the colt in a more imperative manner than a click of the tongue, and if you build up gradually, always retaining your mastery of the situation, and the colt's confidence, you may go far. I mean by the former that you must never place yourself in a position to suffer a fall of prestige. For instance, if you get the youngster to follow you outside before you have him under command, then the chances are, as soon as you go through the gate, the colt will lift his tail above his back and leave you. That smashes all the good your teachings have produced. See to it, when he does think he can escape, that it is only a partial escape which is his—in the big yard or a small paddock, for instance. Then when you have got him again without trouble, and when you bring him to you with a run, that horse begins to think there is something wonderful about you which is worth attention. In this, and to let you know what can be done, let me relate a little story, without indulging in any of the "when I was younger." I had a little grey mare which I'd ridden for five or six years, and there was almost a perfect understanding between us. She'd follow anything I rode, running behind like a dog, and one day I was at the stock camp for dinner with my saddle horse tied to a tree and the little mare poking about. While we were having dinner a motor truck pulled in to the camp—one of those one-ton puffing abominations which paved the way for better machinery to follow. It stopped near where my horse was tied, and before it reached there I was standing beside my horse. The little mare, her ears pricked and her eyes shining with excitement and curiosity, was rubbing against me. In a spirit of flashness, bravado—call it what you will—when that truck started again I called to the mare, ran and jumped on the platform behind. The little thing never hesitated, and almost as I reached the platform of the truck she was beside me, snorting with pretended fear, her four legs braced wide, and with startled eyes peering over the edge of the truck at the ground slipping by beneath her. Now, I look on that sort of thing as being in the highest class of its own type of work—if you'll pardon me so praising my own teachings—and when a thing like that is done, then does a man feel that he has done something and that life is worth the living. Of course, you can't do it on any sort of animal at all. You've got to have the quality in the horse before results like that are achieved.

* From the "Pastoral Review" for October, 1928. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January and February (1929), Journals from the February, April, May, July, and September (1928), numbers of the "Pastoral Review."

### Breaking.

Now let us get on with the breaking. That "breaking" is a hateful word, but it's a trade term, so I suppose we have got to use it. Among other places to which you've led your youngster is the stable. You have put him in a stall and left him there for a few hours for the good of his soul. That is all quite fit and proper. But when that little horse is in there, nervous and wondering what the dickens has happened to him, for the love of goodness don't let anyone stand and stare at him. That makes a horse self-conscious to the same extent that you would feel it, and he is no more comfortable under the process than you would be. Move about him if you wish, talk to him and try and make him feel at home, but don't treat him as an exhibit in a cage. The youngster does not like it. And above everything else don't stand still, look him fairly in the eyes and poke your finger at him. That may sound silly. You can take my tip, though, it isn't. If you will prove my words, please do so on a colt of no account. Put him in the stall, get him nervous and uncomfortable by gazing at him, and then poke your finger at him as I've told you not to do. Watch that youngster's eyes redden, see him move uneasily from foot to foot, and then snap your hand away quick as the colt comes with a charging rush at that pointing finger. Instead of annoying the animal, try and amuse it. Make it feel at home if you can, and bear in mind that it is only a little girl or boy horse you are trying to entertain. One game they seem to like above all others, and of which they never seem to tire, is for the man to place the flat palm of his hand over the lips of their mouth. Without exception they will immediately reach and try and take that hand in their open mouth. They can't. As they reach forward they push the hand further away, and they seem content to play that game indefinitely. And it is not wasted time! Anything which makes a bond of understanding between the breaker and his charges isn't lost effort.

### The Early Morning Ride.

Now that the breaker has two, or three, or more youngsters in hand which have been ridden, and which are merely adding to their knowledge of man and his ways before faring out into the world, if that breaker's got the stuff in him, it is up to him to show his mettle. Every night let him keep one of his youngsters in and let him ride that colt after the horses in the morning. It takes doing, let me tell you, but is worth the trouble. It isn't any fool's job to turn out of a warm bed on a winter's morning, to go to the stall where that half-broken colt is shivering, to catch and saddle him and ride him round the paddocks to yard the horses. If there is a bit of a buck in that colt's repertoire then is the time he is going to show it, and there's going to be many a manifestation of temper when the rider wants the youngster to leave one mob of horses and go and gather another. I always think that early morning ride, uncomfortable though it is, is worth many times a lesson at any other part of the day. It has its little compensations, though. When a man's running horses he gets to understand the horse under him to a greater extent than any other opportunity gives, and in running his other breakers to the yard he gets a glint of their little peculiarities which later he may turn to his own profit. Anyway, for good work, it has to be done—that's the end of it!

### Keep Your Hands Down.

Poets are born, not made, somebody is reported to have said. To a certain extent those more gifted with good hands receive direct from the gods their benefaction. Sympathy, understanding, and hands, and the greatest of these is ——. I'll leave it to your individual selves, but I am strong on hands. What is the use of anything and everything in a horse unless he is responsive? Hands bring that, and hands almost alone are responsible for that perfection. The first thing, and as I have stressed previously, is lightness. Never for one fraction of a second put one portion of an ounce more weight on the horse's mouth than that necessary to achieve its purpose. An advice which has come down the ages is to keep your hands down. It's easy, easy and natural, once you have acquired the habit, and if any difficulty is experienced there is a simple way to accomplish it. If you keep your elbows in you must keep your hands down. Try it and see. There is no need to press with your elbows against your ribs, and there is no necessity to sit stiff and grim like a graven statue and to move in the jerky motions of a mechanical toy. If you let your elbows swing naturally and easily at your sides, not flapping them like a bird about to take flight, you will find, within reason, that your hands are forced into the proper position when you play on the reins.

### Reins not Tiller Ropes.

Gauge the weights accurately and neatly, and don't use the reins as tiller ropes. They are not there for that purpose at all. The reins, really, are more in the nature of an emergency brake. More than half your steering, your desires and wishes are conveyed to your mount through your legs and your grip of the saddle with your thighs. How much does a skilled bicycle rider use his bars for steering purposes? You will find, should you care to note, that the bars aren't used for steering to any appreciable extent. The rider governs his direction by the swaying of his body. You will admit that, I think. Then, having admitted it, take counsel with yourself and think if a living piece of exquisite life isn't worthy of the same consideration as that shown a contraption of wires and hollow pipes. Picture to yourself, if you can, anything more deserving of the severest censure than that of a rider turning his horse by pulling on one rein alone, sitting bolt upright in the saddle, and with the hand holding that rein held out at right angles to his body. You have seen it, and so have I, and in your anger you have, like myself, called down the curses of both the regions beyond on the man who has attempted to exalt his paltry being by posing as the master of a horse. The proper place, and the only place, within reason, for all rein work is just a shade above the pommel of the saddle, and not more than an inch or two on either side of it.

### When the Job is Finished.

Now, before leaving this horse which we have broken, let us deal with a few odds and ends. As I have said before, the time to impose on a colt all the new sensations of his life is the time when he is in the breaker's hands. Though he may never wear shoes, that's the time to lift up all his feet and go through the mock pretence of shoeing him, the time to flap all sorts of unnecessary gear over him, to drive him in a pair of winkers and let him drag something round the yard. All those things the colt has to meet and accustom himself to them by familiarity. And cruellest thing of all, and though your heart bleeds for the baby horse which you've taken under your wing, he has got to have the hobbles on him. This is awful, and almost you writhe in agony in sympathy with your colt's bounds. But it's got to be done, and it is all educational.

And then when you pass your little fellow into alien hands, your work completed, with a great feeling of sadness you watch the little chap leave your loving care and break for ever the bonds of sympathy and affection which you have built up. He goes gaily, not knowing what is ahead of him, and you spit on your hands and go to another fellow waiting you in the round yard.

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*Photo.: Jean Easton.*]

PLATE 82.

"Along the Track that Leads to Home."—An Apple-tree Avenue on Coochin Coochin.

## AGRICULTURE IN THE NORTH.

*The Acting Secretary for Agriculture and Stock, Mr. T. Dunstan, has received the quarterly report from Mr. N. A. R. Pollock, Northern Instructor in Agriculture, Townsville, on agricultural matters generally (apart from sugar-cane) in the Northern portion of the State, and of which the following is a summary:—*

AS a result of the recent favourable rains prospects generally in the Northern areas are good. Particular mention is made of the Muttaburra, Winton, Mackinlay, Julia Creek, Richmond, and Hughenden districts, and to the fact that, owing to the improved condition of pastures, graziers are busy bringing back their sheep from agistment elsewhere, also that hand feeding has entirely ceased in those localities.

In the Northern Division the months of September, October, November, and portion of December usually experience insufficient rainfall to permit the growth of crops except under irrigation, and sowings are not generally made until the wet season begins.

### Maize.

It is estimated that approximately the same area will be cropped on the Tableland as in the previous year. Indications point to the prospects of a heavy crop should the season continue propitious. Approximately 1,000 acres of forest country near Tolga have been reserved, and are sown with the new variety of maize (Durum) bred by the Department of Agriculture, and selected particularly for its suitability to the climatic conditions usually obtaining on the Atherton Tableland. On the coastal areas no increase in the area under maize is indicated.

### Potatoes.

Crops on the Tableland will probably show a slight increase in area, and under the favourable conditions now being experienced should show better yields than those of the previous two years. The coastal crops which are usually planted in April cannot at present be forecasted.

### Peanuts.

Seasonal conditions suggest a better average yield over the area planted, which is comparable with that of the previous season.

### Truck Crops.

Indications point to the possibility of there being a slight increase in the area devoted to such crops as pumpkins, tomatoes, and cucumbers in the Lower Burdekin, compared with that of previous seasons, but, as sowings usually take place in February and March, at this early stage it is impossible to definitely forecast to what extent the area will be increased.

### Green Fodder Crops.

Slight increases in the total areas on the Tableland and coast are expected in these for grazing-off purposes or for conservation as fodder in the form of ensilage. A certain proportion of the area will no doubt be utilised for green-manuring purposes.

Increased interest is being displayed in the matter of growing fodders in the Western country, and in the Stamford, Richmond, and Winton districts areas aggregating 150 acres have been sown with sorghums, cowpeas, and velvet beans in anticipation of being able to conserve those crops as ensilage should the present favourable weather conditions continue.

### Tobacco.

Increased interest is being taken in this crop as the outcome of the encouraging results obtained from last year's trials of pipe and cigarette tobacco in the North, and commercial areas of 4 acres on Hervey's Range, 1 acre at Charters Towers, and ½ acre at Pentland are contemplated. Small experimental trials are being made by interested individuals in order to secure experience for growth on a larger scale should this be eventually recommended.

Regarded generally, present agricultural prospects in the Northern Division are excellent, and greater returns from present growing crops are anticipated than was recorded for last season's crop, at least for this particular season of the year.

# Answers to Correspondents.

## BOTANY.

*From the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.*

### Giant Couch.

W. McK. (Sexton, Kingaroy Line)—

Your specimen is *Panicum muticum*, or Para Grass, generally known in Queensland by its botanical name or as Giant Couch. It is a very valuable fodder, relished by all classes of stock. It does particularly well in districts with a high rainfall, such as the Atherton Tableland, where it is regarded as an important dairy grass. Generally it prefers rather moist country and is not particularly drought-resistant. It has considerable value as a soil binder along the banks of rivers.

### Wild Mint—Chicory.

INQUIRER (Allora)—

(1) *Salvia lanceifolia*, the narrow-leaved Sage, more commonly known in Queensland as "Wild Mint." This plant is a native of the United States of America and Mexico and has been naturalised in Queensland for some years past, first making its appearance in the Pittsworth district. It has now spread to other parts of the Downs and threatens to become a bad weed. We do not know the exact methods of propagation of the plant and therefore cannot give you any very definite instructions as to eradication. With regard to its poisonous properties—this is a popular opinion in Queensland, but there is no record of the plant being poisonous in its native country and we have no definite information based upon feeding tests. Feeding tests would probably be the only means of finding out anything definite on this point.

(2) *Cichorium intybus*, "Chicory."—This is the wild form of the cultivated Chicory. The plant is very widely spread in the temperate parts of the world; and in Australia and the United States of America is regarded purely as a weed and a rather troublesome one at that. Under these circumstances its taproot becomes thin and worthless. In Europe the plant is cultivated to a considerable extent for commercial Chicory and the young leaves are bleached and used as a salad. Spraying is not particularly successful, and the only satisfactory means of control is deep cutting below the crown. Sometimes when the ground is sufficiently soft it may be hand pulled.

### Western Plants Identified.

E.J.T. (Charleville)—Your specimens are—

1. An advanced specimen of *Trianthema decandra*, commonly known as Hogweed, very common in Queensland, and not known to be poisonous in any way.
2. A young growth of Hogweed (*Trianthema decandra*).
3. *Boerhaavia diffusa*, commonly known as Tar Vine, very abundant in Queensland and New South Wales. It has some reputation as a fodder.
4. The specimens in this package are only seedlings that have been eaten off and are rather difficult to determine. We should say, however, the package represents a mixture of seedlings of Saltbush (*Atriplex spp.*), Tar Vine, and perhaps Hogweed.
5. *Morgania glabra*, a small plant very common in Western Queensland and New South Wales, but for which I have not heard a common name. It is not known to be harmful or poisonous in any way.
6. *Ruellia australis*. The same remarks apply as to No. 1.
7. *Euphorbia Drummondii*, the Caustic Creeper. The general characteristic of poisoning by this plant is a marked swelling of the head and neck. It has, however, lately been shown to sometimes produce a prussic-acid yielding glucoside, and if eaten then in quantity by stock when hungry may cause death. Generally speaking, however, paddock stock are little affected by it.

**Grasses Identified.**

R.W.M. (Bundaberg).—Your specimens have been determined as follows:—

1. *Eleusine indica*, the Crowsfoot grass. This grass is very widely distributed over the warmer regions of the world. Like some of the Sorghums, it possesses a prussic-acid yielding glucoside. The glucoside is quite well developed in Queensland plants, but we have had no very definite cases of poisoning by it.
2. *Eragrostis diandra*, a species of Love grass.
3. *Panicum sanguinale*, Summer grass.
4. *Paspalum dilatatum*, common Paspalum.
5. *Eriochloa annulata*, sometimes called Early Spring grass, at other times Dairy grass. Neither name is particularly suitable.
6. *Eragrostis leptostachya*, a species of Love grass.
7. *Andropogon pertusus*, the bitter or pitted Blue glass, rather unpalatable to stock.
8. *Sorghum sp.*—I should say the wild or native form of *Sorghum halepense*. This Sorghum genus is rather difficult to determine specifically in the absence of root specimens, the heads of the native Sorghum, Johnson grass, and Sudan grass being all so similar. The native Sorghum is a perennial with a tufted root stock with young buds generally being sent out, or in winter time perhaps dormant. Johnson grass has long white underground stems which cause it to be such a pest in cultivation. Sudan grass is an annual.

**Northern Plants Identified.**

J.L. (Townsville)—Your specimens from Home Hill are.—

1. *Albizzia procera*, a tree very common in North Queensland and stretching through New Guinea and the Malay Archipelago to India and Ceylon. It is not known to possess any harmful property.
2. *Crotolaria laburnifolia*, a species of Rattle-pod. It has a somewhat similar distribution to the *Albizzia*. Nothing definite has been proved against it, but, as you know, suspicion always attaches to plants of the genus Crotalaria owing to the known very poisonous qualities of some of the members.

So far as we know, Whitewood (*Atalaya hemiglauca*) does not occur in the Home Hill area, but it is quite possible it may be found in some of the drier scrubs of the area, as it is a tree with a wide distribution in Queensland.

**"Glycine Pea."**

W.A.D. (Allora)—

Your specimen is *Glycine tabacina*, the Glycine Pea, a small legume common in the average mixed pasture in Southern Queensland. It is not known to be poisonous in any way, and is, in fact, looked upon as rather a useful fodder.

**"Worm Seed."**

K.W. (Taabinga Village, via Kingaroy)—

Your specimen is *Chenopodium ambrosioides*, a species of Worm Seed, also known as Mexican Tea and Jesuit Tea. It is a native of the warmer parts of America, but is now widely spread as a more or less common weed in various countries. The seeds of this and of a closely allied species are the source of oil of chenopodium largely used in the eradication of hookworm.

**Bitter Bark.**

E.T. (West End, Brisbane)—

Your specimen is Alstonia constricta, commonly known in Queensland and New South Wales as the Bitter Bark or Native Cinchona. The bark has some value as a tonic. We have also heard of it being used successfully in some places as a tick wash. The bark is official in the British Pharmacopœa, but the demand is very limited. It does not belong to the true Cinchona but to the family Apocynaceæ.

## PIG RAISING.

*From the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton.*

### Paralysis of the Hindquarters.

C.D. (Haden)—

In making inquiries regarding sickness in animals it is advisable to furnish all details of feeding, housing, breeding, and other relevant information, so that a better idea of the conditions may be formed by the instructors, thus enabling them to diagnose the trouble more definitely.

Paralysis of the hindquarters may be caused by severe constipation, rheumatism, injury, and a few other items, but, from the particulars you give, the pig becoming suddenly paralysed, and appearing otherwise healthy and bright, may be injured by other pigs or larger animals, thus affecting the nerves of the hindquarters.

The best treatment you can give the pig is to put him in a dry, comfortable pen by himself, feed plenty of greenstuff, and if he becomes constipated give him a dose of castor oil in his feed. Then massaging the loins and rump with plenty of rubbing, and a mixture of turpentine and oil will help to stimulate the tissues.

The prevention of paralysis in pigs is summarised as follows:—Breed from sound constitutioned stock, feed a variety of wholesome foods, with abundance of greenstuff and water, run all pigs in grazing paddocks, and provide clean comfortable shelter. Rickets, a bone disease, which causes malformation of the bones, and in some cases loss of the use of legs, is sometimes mistaken for paralysis. To prevent rickets and keep your pigs healthy and making fast gains in growth, keep a mineral mixture always before them in a separate feed trough placed in a sheltered spot. A practical mineral mixture is as follows:—20 lb. hardwood ashes and charcoal, 15 lb. slaked lime or ground limestone, 40 lb. sterilised bonemeal, and 20 lb. coarse salt.

### Planning a Piggery.

F.W. (Boonjie)—

The chief point in planning a piggery in Queensland is to provide plenty of paddock room, so as to have pigs of all ages on good grazing.

Under grazing conditions pigs not only develop better and are healthier and make cheaper gains in growth, but they can be topped off for market just as well on pasture, provided they are given sufficient concentrated feeds. Also, when topped off on pasture, there is little chance of the pigs being overfat, because of the exercise they get.

A useful type of piggery would be sufficient paddocks, say, ¼ to 1 acre in area, fenced with split palings and wire, or K wire; and in these paddocks have houses sufficiently large to protect the pigs in rough weather and give them shelter from rain, sun, and wind.

There is no need to go to any great expense over these sheds. A good type which is used on up-to-date pig farms is as follows:—6 feet high at front, 5 feet high at back, and 7 feet deep and any length, say, 9 feet long. Just the ordinary open-fronted shed with two ends and back boarded up with rough timber such as palings, an iron roof, and floor of 1-inch boards 1 foot off the ground to keep it dry. Round or sawn timber can be used for the walls, and any old iron for the roof. A shed of this size in each yard will accommodate pigs of any age, and if a sow and litter were to be locked up a few battens made into a hurdle across the front of the shed would do the job. The cost of the shed would be £2 to £5, depending on the class of material used, and it would be large enough for a sow and litter or for from fifteen to twenty young growing pigs. With paddocks and shelters like these either concrete or wooden troughs could be used and moved about occasionally to keep the ground from becoming too wet.

The open-fronted shed just described is durable, cheap, dry, and comfortable, and gets the full benefit of the morning sun right inside, and provides shade on one side all day.

**Worms in Pigs.**

A.L. (Frenchton)—

From your description—coughing, panting, and general debility in the pigs commencing when they are about three weeks old—they are apparently suffering from worms. The common round worm is present in most of our piggeries. The adult worm grows to about 10 inches long in the intestines of the pig, and lays thousands of minute eggs which pass through the pig and are deposited about the pens, yards, and troughs. These eggs are in time swallowed by the pigs when they eat out of dirty troughs or from muddy floors, or by suckers whose dam has been lying in the mud and whose udder is covered with filth. When they hatch the embryo worm enters the blood stream of the body, and in time passes through the lungs. While in the lungs these tiny worms, which cannot be seen by the naked eye, may set up coughing and panting and inflammation which may then lead to pneumonia. From the lungs they are coughed up and swallowed, when they pass into the intestines and increase in size and in turn lay eggs which pass out to infest more pigs. The effect of these worms is more severe on young pigs than on older ones. The first treatment for worms is to clean up the piggery thoroughly and remove litter regularly, keep troughs clean, use plenty of disinfectant, have the troughs so arranged that the pigs cannot lie or stand in them, and, above all, run the pigs in clean pasture paddocks instead of penning them in filthy yards or sheds.

*Treatment.*—Starve the pigs for twenty-four hours, then give them a small feed of skim milk containing turpentine and castor oil. For pigs weighing 100 lb. live weight, a sufficient dose would be one-third of a teaspoonful of turpentine and two tablespoonsful of castor oil. The size of dose must be regulated to suit the size and number of pigs to be treated. Mix the medicine thoroughly with the food, and see that each pig gets its share of the dose. This treatment must be repeated in exactly the same way two weeks later, for it must be remembered that the worms can only be killed by the medicine while in the stomach and intestines, and it takes about twelve days for the developing worms to pass through the lungs back into the stomach. Even when the young worms have passed into the stomach and intestines they are still often too small to be seen without a microscope. If this treatment is carried out to the letter, good results should follow.

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*Photo.: Jean Easton.*]

PLATE 83.—"WHERE THE PELICAN BUILDS HER NEST."

One of the little brooks that meander through the fertile Coochin Country.

# General Notes.

## Staff Changes and Appointments.

Messrs. J H. Mitchell, P. Mitchell, and N. L. Miles have been appointed Temporary Inspectors under and for the purposes of the Diseases in Plants Acts, Mr. J. H. Mitchell until the 30th June, 1929, and Messrs. P. Mitchell and N. L. Miles for a period of three months. They will be stationed at Nambour, Currumbin, and Woombye respectively.

Mr. P. McCarthy, of Widgee, via Gympie, has been appointed an Honorary Inspector under the Diseases in Plants Acts.

Mr. G. P. Randles, of Kenmore, has been appointed Inspector of Slaughter-houses on probation.

Mr. F. A. Toop, of Holbrook, Nanango, has been appointed Officer under and for the purposes of the Animals and Birds Acts.

Mr. L. A. Burgess, Assistant to Analysts, Agricultural Chemical Laboratory, has been appointed Analyst, Agricultural Chemical Laboratory, Department of Agriculture and Stock, as from 12th February, 1929.

Mr. K. King has been appointed Inspector on probation under the Diseases in Plants Acts and will be stationed at Cooran.

Mr. C. D. Vere Hodge, of Cardwell, has been appointed Officer under and for the purposes of the Animals and Birds Acts.

Constable A. H. Holzberger, of Hebel, has been appointed Inspector of Slaughter-houses.

Mr. J. J. O'Brien, Glastonbury, via Gympie, has been appointed Honorary Inspector under the Diseases in Plants Acts.

Mr. F. J. Webber, of Burketown, has been appointed Government Representative on the Burke Dingo Board, and Messrs. F. Walden, A. J. Reid, J. Gaden, and E. G. Rotherey have been elected members of that Board.

The Officer in Charge of Police, Monto, has been appointed Acting Inspector of Stock as from 23rd February, 1929.

The Inspector of Stock, Miles, has been appointed Government Representative on the Condamine Dingo Board, vice Mr. W. M. Nash, resigned, and the Inspector of Stock, Charleville, has been appointed Government Representative on the Warrego Dingo Board, vice the Police Magistrate, Charleville, relieved of the position.

Mr. Jas Carew, Acting Senior Instructor in Sheep and Wool, has been appointed Senior Instructor in Sheep and Wool, Department of Agriculture and Stock, as from 1st January, 1929.

## Cotton Board Election.

The Cotton Board election resulted as follows:—

District No. 1. (North of Bundaberg on the North Coast Line)—
John Beck, Stanwell—Returned unopposed.

District No. 2. (Wowan District)—
Harry Reeves Brake, Wowan .. .. .. .. 140 votes
Charles George Young, Wowan .. .. .. .. 117 votes

District No. 3. (Callide Valley District)—
George Herbert Bradley, Argoon, via Rannes .. .. 137 votes
Alfred Charington Webb, Thangool .. .. .. 132 votes

District No. 4. (Upper Burnett)—
James Bryant, Chowey .. .. .. .. .. 174 votes
Edward James Basson, Three Moon, Monto .. .. 121 votes

District No. 5. (South Burnett and Lines to Grandchester)—
David Charles Pryce, Toogoolawah .. .. .. 89 votes
Charles Litzow, Vernor .. .. .. .. .. 39 votes

District No. 6. (Lockyer and Darling Downs)—
Ferdinand August Kajewski, Ma Ma Creek—Returned unopposed.

The successful candidates at this election will hold office as from the 19th February, 1929, to the 31st December, 1931.

### Egg Board.

By regulation under the Primary Producers' Organisation and Marketing Acts the period of time during which the Egg Board shall, out of the proceeds of the eggs disposed of by that Board, make payments to each grower on the basis of the net proceeds of the sale of the commodity of the same quality sold by the Board has been prescribed to be from the 1st January, 1926, to the 2nd March, 1929.

### Equalisation System for Butter Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts amending the original constitution of the Queensland Butter Board in so far as the system of equalising returns to factories is concerned. Practically no alteration has been effected in the system which has now been in operation by the Butter Board for some time, but the amendment to the Board's constitution merely makes clearer the actual system in operation.

### Stanthorpe Fruit and Vegetable Levy Regulations.

By regulation under the Fruit Marketing Organisation Acts the Stanthorpe Fruit and Vegetable Levy Regulations, which originally applied to growers of fruit and vegetables in that part of Queensland situated within a radius of 40 miles from Wallangarra and railed from any railway station within that district from the 27th February, 1928, to the 25th February, 1929, have been further extended to apply until the 25th February, 1930. The levy in question is payable on the basis of the quantity of fruit and vegetables grown in the district aforesaid, and is at the rate of 5d. per ton and a proportionate part of 5d. for each fraction of a ton of weight of such fruit and vegetables railed in any one consignment from any railway station in the area mentioned. A minimum amount of 1d. is prescribed in respect of any one consignment by every grower.

The proceeds of the levy shall be used, firstly, in payment of any cost attached to the collection or recovery of the amount of such levy; secondly, in making financial grants to the various local associations in the district as may seem appropriate by the Committee of Direction; and thirdly, the balance to be paid to the Deciduous Sectional Group Committee to be used by it at its discretion.

### School of Instruction for Pig Farmers at Gatton College.

Attention is called to the Annual School of Instruction for Pig Farmers to be held at the Gatton College during the period 10th to 20th June, 1929.

These schools have been organised to provide the means whereby farmers and their sons desirous of improving their knowledge of the business of pig raising may come together at a convenient centre for the purpose of meeting one another, of attending practical demonstrations, lecturettes, and indoor studies covering several phases of the industry. The success of the first school held last year is sufficient guarantee that this year's school will be equally as popular, and as early application is necessary it would be well for those interested to get in touch with the Principal of the College so that arrangements may be completed in ample time before the opening date. Provision has been made for accommodation, meals, and other services and those attending may be assured that their personal comfort will be well studied. The social side of the life of these schools is a special feature, while each evening before the lecture session begins, opportunity is offered for a free and easy hour for questions and answers on any agricultural or related subject. At these sessions officers attend who are associated with other branches of college life, and question time is one of the most interesting periods of the day for those of the school members who are interested in orcharding, dairying, and other pursuits.

The evening cinematograph and lantern lectures are also of much interest and value. At these lectures other college students attend while, as opportunity offers, prominent authorities on agriculture give addresses on appropriate subjects.

An added attraction will be a visit of inspection to the Metropolitan Bacon Factories, for here the several operations associated with the manufacture of pork products may be seen in full swing. Apart from the educational advantages of such a visit, the day's outing is looked forward to with a great deal of interest by those fortunate enough to attend.

The school fees are exceptionally reasonable and concession fares on the railways are available to those attending. Further particulars may be obtained on writing to the Principal, Queensland Agricultural High School and College, T.P.O. South, or from the Department of Agriculture and Stock, Brisbane.

### Control of Arrowroot Flour.

The referendum to decide whether or not arrowroot flour should be placed under the control of the Arrowroot Board was held on the 1st February, with the result that eighty-one voted for the placing and sixty-seven against. As there was not the necessary three-fifths majority, the proposal lapsed.

### A Tribute to the Journal.

Thus "Merricus," of Dalby (using the wires in the boundary fence for a harp):—If the hens won't lay and the cock won't crow; if you don't know what's the seed to sow, just send a bob—a shiny "deener"—for a book for which no price is keener; and the very next month after this wise move you'll get all the knowledge you want, by Jove!

### Broom Millet Board.

By Order in Council made under the Primary Producers' Organisation and Marketing Acts the operations of the Broom Millet Board have been extended from the 11th March, 1929, to the 31st October, 1931, and Messrs. H. Niemeyer (Hatton Vale, Laidley), E. M. Schneider (Binjour Plateau), and L. R. Macgregor (Director or Marketing) have been appointed members of the Board from 11th March, 1929, to 10th March, 1930.

### Pineapple Levy Regulations Extended.

By additional regulation under the Fruit Marketing Organisation Acts, the Pineapple Levy Regulations have been extended for a further period from the 25th January, 1929, to the 24th January, 1930. The levy in question is at the rate of ½d. per case of pineapples and, in instances where they are sold loose, at the rate of ¼d. per forty-two rough-leaf or ½d. per twenty-four smooth-leaf pineapples. The levy is collected by means of stamps purchased from the office of the Committee of Direction and affixed to account sales.

### Proposed Strawberry Board.

Notice has been given of the intention to create a Strawberry Board to deal with all strawberries produced in Queensland for sale for a period of one year, such Board to consist of three elected representatives of growers and the Director of Marketing. Nominations for growers' representatives will be received up to the 21st March, 1929, and each nomination must be signed by at least seven growers of strawberries. Persons deemed to be growers and eligible to vote are persons who, at any time during the period commencing on the 1st January, 1928, and ending on the day of the poll, have had growing for sale strawberries in any part of Queensland. On the constitution of the proposed Board, the whole of the strawberries shall forthwith be divested from the growers and become vested in and be the property of the Board.

### Normal Temperature of Animals.

The temperature, as taken with a thermometer, is an index of the heat of the blood, and this, even in the healthy animal, varies within certain limits. The normal temperature is raised slightly after a meal, during rumination, lactation, and in pregnancy. Work also raises it, so that the normal temperature of the same animal may be slightly higher in the evening than in the morning. Young animals have a slightly higher normal temperature than old ones, and animals of ardent and sanguine temperament a higher one than sluggish and phlegmatic ones.

| | Degrees Fahr. |
|---|---|
| Horse | 99.5 to 101 |
| Ox | 100 to 102,5 |
| Sheep | 101 to 104 |
| Goat | 101 to 104 |
| Pig (adult) | 101 to 102 |
| Pig (young) | 102 to 104 |
| Dog | 100 to 102 |
| Rabbit | 100.85 to 102 |
| Cat | 100.4 |
| Fowl (average) | 107 |
| Small bird | 108.6 |

### Lake Pleasant, a Sanctuary for Animals and Birds.

Lake Pleasant, via Goovigen, Dawson Valley line, and an area within ten chains of the borders of that lake, have been declared a sanctuary for animals and birds.

### Sanctuary at North Pine.

The properties of Mr. A. J. Wyllie and the adjoining Reesrves (R. 125 and R. 120) at North Pine have been declared a sanctuary for animals and birds. In connection with this sanctuary, Messrs. A. J. Wyllie and T. P. Sweeney have been appointed Officers under and for the purposes of the Animals and Birds Acts.

### Poison for the Destruction of Noxious Plants and Useless Timber.

The attention of landholders is directed to an advertisement of the Prickly-pear Land Commission appearing in this issue relative to the use of arsenic pentoxide for the destruction of noxious weeds and useless timber. This poison, as is well known, has been proved to be most effective in the destruction of prickly-pear, and the Government has now authorised the Commission to make it available for the destruction of other weeds on the same terms as for prickly-pear destruction. The prices charged are on a low scale, and, in addition, the Commission pays railage.

### Orchard Cultivation—Economy of Zigzag Tillage.

Discussing in the current "Agricultural Gazette" (N.S.W.) the important subject of orchard cultivation, the Orchardist of Glen Innes Experiment Farm observes that the most efficient and economical method of cultivation adopted at the farm orchard has been what might be called the "zigzag diagonal" method.

By using such a method both ways and with careful driving, hoeing is practically eliminated. The zigzag cultivation may be carried out in the direction of the rows of trees and crosswise, but the angular turns are so sharp that they do not allow of freedom in driving. Trees planted 24 feet apart on the square give a distance of 34 feet on the diagonal, and if the cultivations are carried out in the direction of the diagonals, the greater distance between trees affords more freedom for driving the horses. By using the zigzag method—that is, by driving the horses from one side of the diagonal row to the opposite side immediately after they have passed the tree—the cultivator can be drawn as close to the tree as the driver desires and no ground need be left unstirred; indeed, care has to be taken not to allow the horses to cut in too quickly lest damage be done by the cultivator cutting the trees. When an extended springtooth cultivator is used there is little risk of damage if the necessary care be taken in driving.

On those sides of the trees on which the cultivator is travelling a small triangle of ground is not stirred, but if the succeeding cultivation is done diagonally crosswise to the preceding one every square inch of ground is cultivated.

### Pigbreeding in Denmark.

One of the most practical and efficient systems of swine breeding in existence is the one in operation in Denmark for the last few decades. It was planned and organised by the late P. A. Morkeberg. All breeders co-operate under the leadership of the Department of Agriculture in maintaining certain high standards and in producing the finest type of market pig. The registered breeding stock of the country is maintained in State-supervised breeding centres. Any farmer who has shown his ability over a period of time to raise purebred pigs can, upon application, have his farm certified as a breeding centre. Every animal intended for breeding purposes in such a centre must be approved by a representative of the Department of Agriculture, and its progeny must be subjected to a production test in one of the three Government swine breeding experiment stations before such a breeding animal can be certified and registered.

Four pigs from each sow are sent to the breeding station, there constituting an experimental lot. The rapidity of growth and economy of gain is ascertained, and upon reaching a weight of 200 lb. the pigs are slaughtered and subjected to a detailed killing test. This standard of achievement is extremely practical, for it does not involve showyard winning or extreme production of any sort, but rather the ability to beget litters that will make a quality export bacon as cheaply as possible. If a sow fails to demonstrate sufficient fertility or produces pigs that do not measure up to the standard, she will not be admitted to the herd, and no offspring from her can be registered.

### The Foundation of Farming—The Cow.

The cow really forms the foundation of the farming industry. Not only does she supply the world with all the milk products, such as butter, cheese, milk, and cream, but almost all her flesh can be eaten, and beef is the staple meat of most countries. Her hide is used for making leather, and her hair for mixing with plaster. Glue is made from her hoofs, and gelatine powder from her joints. When everything else is removed her bones are ground into fertiliser. No other animal serves mankind in so many ways.

### Cause of Soft Pork.

The experimental farms have been hunting down the cause of soft pork, and come to these conclusions: Pigs fed a ration which is lacking in balance go to the shambles without the bloom which a well-conditioned young porker should show. These are the pigs which make up into soft pork. Certain feeds are more prone to cause this defect in meat than others, but it is believed that any feed given exclusively will bring about that lack of vigour and thrift which is invariably associated with soft pork. These same feeds properly compounded into a balanced ration will produce no bad effects on the finished product.

### A Tank Stand.

A suitable stand for a tank can be made by filling a ring of corrugated iron with sand. The ring should, of course, be well riveted, and it is also advisable to further strengthen it by means of hoops of fencing wire twitched up hard against the iron.

The greatest pressure on the floor of the tank will be about its centre, and it is advisable, therefore, to give the sand filling a slight crown at the centre so that the tank, when full, will settle with a level floor. The life of the floor of the tanks, and also of the ring of galvanised iron will be greatly extended if the surfaces coming in contact with the sand are given a wash of cement.—N. L. Jones, in the "Journal of Agriculture," N.S.W.

### A Good "Handler."

Why are there so many hard feeders and bad thrivers amongst our commercial stock? Simply because no regard is paid in the breeding of many of our "stores" to those points that are productive of quick growth, early maturity, and capacity to fatten. Many of the bulls in use in dairy herds handle more like shoe leather than a kid glove, and it is their stock that feeders and graziers have to waste time and money on in fattening for the butcher. Another important point in the handling of a beast is to see that it has width of loin. A celebrated judge of cattle years ago, who officiated at many of the leading shows all over the country, was blind, and depended entirely on his hands in forming his judgment. He usually felt the loin and the skin and hair, and if they satisfied him it was enough. It is said that he seldom, if ever, was wrong in his judgment. That says much for the importance of "good handling" and a strong wide loin. There certainly has been some improvement in the last decade in the loins. There are fewer "slack" loins than formerly, and we see fewer animals "dipping" in the loins when standing, which was a very common fault a few years ago, particularly in the short-legged, big-bodied type of beast. Any animal to win in a showyard to-day must carry its back well and maintain the straightness of the top line when standing still. Slack loins are difficult to breed out, and it should always be made a strong point in a breeding animal that the loin is wide and strong, and the hand should be put over it to feel that it is so.—"The Live Stock Journal" (England).

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### COMMON ERRORS IN THE MANAGEMENT OF THE BABY.

A mistake very frequently made, and which may lead on to very serious results, is that of giving the newborn infant artificial food in its first two days of life, before the mother gets her milk supply. We know that the mother's milk does not come in until the end of the second day, or the beginning of the third day after baby is born. Many mothers at this time get distressed at the thought that they have no food for baby, and in their anxiety they give him a bottle with artificial food of some kind. A food that is commonly selected is condensed milk, and it is usually given with the idea that it is merely a temporary measure to last only for the day or so, until the milk comes in. Every baby likes sweet things, so he takes the bottle willingly, and, in the time during which it is given to him regularly, he becomes very fond of it. Usually it is given from a feeding bottle with a large-holed teat, from which he gets the food, almost without the trouble of sucking for it. A little later the mother has plenty of milk and the baby is expected to take it. But mother's milk is only faintly sweet and baby does not like it nearly as much as he likes the very sweet condensed milk. Also, to get his mother's milk he would now have to suck vigorously, which he could not be expected to do to obtain food which he does not like. Naturally, he refuses to take the breast, and cries lustily for what he wants. The mother is distressed, as she realises that baby is refusing his food when he must be hungry. She strives, for half an hour or more, to make him feed, and at the end of that time both mother and child are tired out. The baby is screaming with hunger and disappointment and rage; and by this time quite possibly the mother is crying too. Then, in her distress she gives him another bottle of condensed milk, and so it goes on. When the next feed is due baby again fights and screams, and refuses the breast, and once more the sweet condensed milk is given. Because the mother is worried and anxious, and also because her milk is not being used, it first decreases in quantity, and later dries up altogether, so that baby is soon fully weaned. He must then be brought up on a bottle, with all its risks and disadvantages. This happens because the mother does not know that the very small quantity of food which she has for her baby during the first two or three days of his life is amply sufficient for his needs at that time.

#### Result of the First Mistake.

Put him regularly to the breast during the day; give him drinks of cool boiled water between his feeds and he will require nothing more. So managed, when the mother's milk comes in, he will go willingly to the breast, and subsequent natural feeding is carried on without difficulty. It is not only condensed milk which can cause this trouble, though on account of sweetness it is probably the worst; other foods, e.g., dried milk or cows' milk sweetened with ordinary sugar, can have the same result. Whatever food is given to the baby and readily taken by him in his first days he becomes accustomed to, and demands in the only method at his command, i.e., by crying lustily. This crying is very disturbing to a mother, particularly one with her first child. It is her anxiety for his good which had led her to make this mistake, which can have such serious results. Later she says, "I had to wean baby; he would not take the breast," not realising that by her own actions she has been responsible for his weaning. So give baby, in his first two or three days of life, and for nine months after, what nature intended him to have—his mother's milk.

### "Dummy" Condemned.

This is a most common practice. Many babies are given the dummy soon after birth; sometimes even during the first day. With regard to the dummy, I think the mothers cannot all plead ignorance. I think a great number of them know that baby should not have it, but I am sure that they do not realise fully the ill results that may follow its use. If they did, they would not give it to him. No mother who loves her baby wishes to do him harm, yet by giving him a dummy she is exposing him to serious risks.

Now, let us consider the baby who has a dummy given to him on his first day. It is put into his mouth, and because he is born with the sucking instinct strongly developed he enjoys sucking it. He is not very hungry during his first day or two, but in that time he gets used to the dummy teat, and the feel of it in his mouth. When it falls out of his mouth he misses it, and cries for it to be replaced. Then the mother's milk comes in; also, at this time, baby gets hungry. He is put to the breast, but, being accustomed to the shape and size of the dummy, he resents the change. So he screams, and refuses to suck, and the worried mother, after endeavouring in vain to make him feed, gives him a feeding bottle with artificial food. This, as before explained, is the first step towards the weaning of the child.

### A Grave Risk of Infection.

But the use of the dummy is still continued. Sometimes the baby cries. He may be wet, or too hot, or otherwise uncomfortable, which causes him to cry in spite of the dummy being put in his mouth. Then, not infrequently, it is dipped in honey or condensed milk, or glycerine and borax, or malt extract, or some other sweet stuff before being replaced in his mouth. Of course baby likes the sweet stuff, and for the time being stops crying. But very quickly he learns that he can get the pleasant substance by crying for it, and this he does, more and more often. Such things, repeatedly given, can lead to severe digestive upset. Glycerine and borax frequently given in this way can act as a poison to the baby. At night the baby who is accustomed to a dummy goes to bed with it in his mouth. As he falls asleep his lips relax and the dummy falls out. Even when almost asleep he misses it, rouses, and cries until it is again put in his mouth. So it prevents his sleeping as well as he would do without it. The dummy is a grave risk of infection for the infant. If it is not pinned on his frock it frequently drops on the floor, where it picks up dirt, and then, after being casually wiped—sometimes on the mother's handkerchief—it is replaced in baby's mouth. Frequently it is pinned to baby's frock, where it is still very dangerous. Every summer we have an epidemic among babies, sometimes called gastro-enteritis, sometimes called summer diarrhœa. It is really dysentery, and is caused by disease germs, which are carried by flies. When the dummy falls out of baby's mouth and hangs pinned to his frock, flies are attracted by the warm moist surface. They alight on it and infect it, perhaps with the germs of dysentery. This infected dummy is put in baby's mouth and he may become very ill. Many babies die of summer diarrhœa every year. Breast-fed babies, unless they have dummies, seldom get the disease. Another reason why a dummy should not be used is because constant sucking of it is tiring to baby's jaws. Then, when he is put to the breast, and should suck strongly, he is too tired to do so, and as a consequence, he may not get the quantity of food he needs. In addition, there is the effect on the child's character. The baby who, throughout infancy, has been trained, whenever not sleeping or feeding, to demand a dummy to suck constantly will develop later into the spoilt child who demands his own way in other directions, and cries until he gets it. So giving baby a dummy is frequently one of the first steps in the spoiling of the child.

### Evil Results Summarised.

It may make him refuse to take his mother's milk; this frequently leads to weaning, and all the risk, work, and expense attendant on the artificial feeding of an infant. It is well to remember here that the death rate among artificially-fed infants is much higher than among those who are breast-fed. Putting sweet things on the dummy may result in severe digestive upset. Because he wakes up when the dummy falls out of his mouth, it can cause broken nights for both mother and child.

It will certainly expose baby to grave risk of infection from flies. Dummy-sucking tires baby's jaws, and as a result he may not take all the food he requires for his growth and health. Indulging baby with a dummy means helping to spoil him. Mothers say that they give baby the dummy to keep him from crying. If baby cries unduly do not put a dummy in his mouth, look for the cause of the crying and try to remove it. A baby who has never had a dummy never cries for one. If baby cries for a dummy it means that he has been trained to expect it.

## KITCHEN GARDEN.

Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally, except cucumbers, marrows, and pumpkins. In connection with these crops, growers are recommended to adopt some form of seed selection for the purpose of improving the quality of vegetables grown by them. Just at present, selections should be made from all members of the cucurbitaceæ (pumpkins, cucumbers, &c.). Tomatoes should also be selected for seed. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

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## GROWING GOOD LETTUCE.

If you would have really good lettuce do not rely on one sowing only. It is better to sow a little seed every ten days or so than make one sowing only. Do not sow thickly. Try the plan of manuring a shallow trench, covering it with fine soil, and then dropping two or three seeds at given distances, say 4 inches apart. Little thinning will be required, and the plants will make uninterrupted growth. These will mature quicker once they get a start than transplanted plants.

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## RHEUMATISM.

### What it Does.

Rheumatism in childhood causes heart disease in manhood.

Rheumatism in manhood causes—

- Pains in the bones and aches in the joints;
- Crippled limbs and shooting nerves;
- Lumbago and sciatica.

Rheumatism is a strong man's burden. It is easy to find, but hard to lose.

### Why it Comes.

Rheumatism rules where the body is unhealthy and is being poisoned.

The poison comes from germs living on—

- Bad teeth;
- Enlarged tonsils;
- Unhealthy throats;
- Discharging ears;
- Festering sores.

From indigestion and constipation;
From cold, damp houses;
From damp, cold clothes;
From too heavy work and too little sleep;
From drinking too little water and too much alcohol.

### What to Do to Avoid It.

Wear clothes, clean, dry, and airy.
Change clothes, wet with sweat, quickly after work.
Wear more clothes when facing cold air after being before hot furnaces.
Keep your feet dry.
Eat fresh food, well cooked.
Eat fresh fruit, vegetables, and eggs, and drink fresh milk.
Eat slowly and in comfort, not sitting on some cold stone.
Drink plenty of fluid; but avoid alcohol, or if taken, take at meals sparingly.
Take care of your teeth; toothache and rheumatism go together.
Look after your throats, especially the tonsils of children.
Have running ears properly treated.
A clear skin and a warm bath are great helps to a healthy body.
Avoid undue strain after forty years of age.
Take eight hours' rest every night.
Help your body to be healthy, and your body will help you to be happy.—
E. L. Collis, M.D., M.R.C.P.

## THINNING GROWING CROPS.

The presence of superfluous plants in a row retards and weakens the growth of the entire row. Therefore, the advantages which follow early thinning should be sufficiently obvious to all. Crops such as beetroot, parsnip, and salsafy, the small roots have no culinary value, should have a first and final thinning as soon as the seedlings are through the soil, but when dealing with others, such as carrots, onions, turnips, &c., at all stages of their growth a different course should be followed. The first thinning of each of these should take place when the plants show the true leaf. At the same time give the rows a sprinkle of old soot or wood ashes to make the tops distasteful to birds. A fortnight later each alternative plant in the row may be drawn and, if during the interval, a few warm showers have fallen, many of the largest of the thinnings will have at least some value in the kitchen. Continue to draw away each alternative plant until those in the row in the long growing or intermediate section stand from 6 to 9 inches apart. Large turnips are rarely sought after by those who appreciate them during the summer: in fact anything above the size of an ordinary orange seldom finds favour. To secure these the first thinning out should take place soon after the seedlings appear. Allow 4 inches between the plants, which distance will provide space for all to develop into decent bulbs before they touch each other, when each alternative one may be pulled up. If not required at once these keep much better if again "laid in" where the soil is damp. The neglect of timely thinning out is more apparent with onions than with most vegetable crops. Instead of leaving the whole bed in an overcrowded state until the plants have reached a critical stage, why not thin all except the outside row when the plants are 3 to 4 inches high. After thinning the outside rows as suggested these onions may be drawn upon to continue the supply for salads when those in the beds have attained the size of walnuts. After thinning out either of the above-mentioned crops, it is very necessary that a little more than ordinary attention be paid to the beds, and should no rain promise, give the rows a watering through a fine-rosed can, which, in addition to settling the soil about the roots, keeps the plants in a fresh condition, and having received little or no check, they soon settle down to new growth. Twenty-four hours after watering give the soil between the rows a stir with the hoe, and just before the next storm use nitrate of soda, at the rate of one ounce to each square yard, keeping this from the foliage.

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## TO REPAIR A LARGE LEAKY GALVANISED IRON TANK.

Carefully clean out the inside of the tank by removing all grease, dirt, and corroded incrustations; but this must be done carefully or the holes will be enlarged.

Both inside and outside should be cemented, especially if the holes are numerous. It is not then necessary to stop the holes with any special stopping, as the cement compo when laid on will pass through the holes on to the outside and will form a much better key than if they had been stopped.

Commence with the inside, and after cleaning as above described, give the sheets a coating of cement-wash (pure cement and water), about the thickness of cream, starting at the top and working down about 3 feet at a time. Then, before this is quite dry, fill in all the corrugations with a compo consisting of one part cement to one-and-a-half parts of clean, sharp sand. Proceed in this way to the bottom, then, as soon as possible, begin again at the top and lay on a coat three-quarters of an inch thick of one cement and one and a-half sand, and finish off with a wood or steel float.

Cover the bottom of the tank with wire-netting about 1-inch mesh, and before finishing the sides turn up some strips of netting at intervals against the sides and cover them with cement. Then cover the whole of the bottom with three-quarters of an inch of compo as before, and work it well with a wood or steel float. Run a fillet about 1½ inch wide all round at the intersection of the side and bottom.

To make a thorough job of a tank of this size, the outside should then be treated in the same way. which will make the walls of the tank about 2½ inches thick and very durable. Thirty-two bags of cement and about three yards of sand will be required to do both sides and bottom. Nineteen bags of cement and two yards of sand for inside and bottom only.

To line a 1,000-gallon tank as above, one side only, two casks or six bags will be required with half a load of sand.

# Orchard Notes for April.

## THE COASTAL DISTRICTS.

In the Orchard Notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus, and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus becomes toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruit flies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly cleared land time to sweeten before planting.

Strawberries can still be planted, and the earlier plantings must be kept well worked and free from all weeds in order to get a good crop of early fruit.

Scrub land intended for bananas can be felled now, as there will be little more growth, and it will have ample time to dry off properly in time for an early spring burn. Do not rush scrub falling, as it is work that pays for extra care. Lopping will improve prospects of a successful fire.

Keep a keen lookout for fruit flies, and on no account allow any fallen fruit of any kind to lie about on the ground unless you are looking for trouble with the ripening citrus fruit. Keep the fly in check, and there will not be any very serious losses; neglect it, and there will not be much fruit to market.

The advice given with respect to the handling and marketing of citrus fruit applies equally to custard apples, pineapples, bananas, and other fruits. In the case of bananas handled by the Committee of Direction of Fruit Marketing, grading is now compulsory, and it will undoubtedly tend to stabilise the market for this fruit.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Practically the whole of the fruit crop will have been gathered by the end of March, but several of the later-ripening varieties of apples grown in the Granite Belt may be kept for a considerable time, provided they are free from fly or other pests and are stored under proper conditions. Varieties such as Jonathan can be kept for some months at a temperature of 31 to 32 degrees, and later varieties, such as Granny Smith and Sturmer, can be kept till apples come again if stored at the same temperature. At the same time, although storing the fruit at this temperature under artificial conditions enables them to be kept for many months, the fruit can be kept for a considerable period, and marketed from time to time as desired, by storing it in a specially constructed apple-house in or adjacent to the orchard where grown.

Such a store can be cheaply constructed in the side of a hill out of the soil of the district and slabs of timber. The soil will make excellent pisé for walls, and the roof may be constructed of slabs covered with soil. Such a store can be kept at a very even temperature, and if the air is changed during cool nights—not frosty nights—the temperature can be reduced to a low point—low enough to keep the fruit in good condition for many weeks.

All orchards and vineyards not already cleaned up must be put in order, and all weeds destroyed. Keep the surface of the soil stirred so as to give birds and insects a chance to get at any fruit fly pupæ, as it is necessary to destroy this pest whenever there is a chance of doing so.

Land intended for planting during the coming season should be got ready in order to expose the soil to the cold of winter, thus rendering it sweeter and more friable.

If there is any slack time in the course of the month, go over all surface and cut-off drains and put them in good order. Also, if during periods of heavy rain, soft or boggy spots have made their appearance in the orchard, do what draining is necessary, as badly drained land is not profitable orchard land, and the sooner it is drained the better for the trees growing upon it. Soft or boggy spots are frequently caused by seepage of water from a higher level. In this case a cut-off drain will be all that is necessary, but where the bad drainage is due to hard pan or an impervious subsoil, then underground drains must be put in. After draining, the land should be limed. Liming can be done now and during the following three months, as autumn and winter are the best times to apply this material.

When the orchard soil is deficient in organic matter (humus) and nitrogen, try the effect of green-crop manuring, planting the grey or partridge pea and manuring the ground for this crop with a good dressing of finely ground island phosphate or basic phosphate.

Where citrus fruits are grown, they should now be ready for marketing. If the land needs it, it should be given an irrigation, but unless the trees are suffering from want of water it is better to stick to the use of the cultivator, as too much water injures the keeping and carrying qualities of the fruit.

The remarks on the handling and packing of citrus fruits in the coast districts apply to the inland districts also, but these districts have an advantage over the coast in that, owing to the drier atmosphere, the skin of the fruit is tougher and thinner, and in consequence the fruit carries better.

# Farm Notes for April.

Field.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April. Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922, Journal.

Potatoes should now be showing good growth and must be kept free from all weed growths by means of the scuffler. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and where necessary, thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat—i.e., those which require a fairly long period to develop in, every effort should be made to bring the seedbed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

*Photo.: Jean Easton.*]

Plate 84.

Looking down on the Coochin Country from Minto Crag.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | March, 1929. | | April, 1929. | | MOONRISE. Mar., 1929. | April, 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | p.m. |
| 1 | 5.46 | 6.24 | 6.4 | 5.48 | 9.45 | 10.25 |
| 2 | 5.47 | 6.23 | 6.5 | 5.47 | 10.20 | 11.16 |
| 3 | 5.48 | 6.22 | 6.5 | 5.46 | 11.0 | 0.0 |
| | | | | | | a.m. |
| 4 | 5.48 | 6.21 | 6.6 | 5.45 | 11.46 | 12.11 |
| 5 | 5.49 | 6.20 | 6.7 | 5.43 | 0.0 | 1.6 |
| | | | | | a.m. | |
| 6 | 5.49 | 6.19 | 6.7 | 5.42 | 12.34 | 2.5 |
| 7 | 5.50 | 6.17 | 6.8 | 5.41 | 1.28 | 3.5 |
| 8 | 5.50 | 6.16 | 6.8 | 5.39 | 2.22 | 4.4 |
| 9 | 5.51 | 6.15 | 6.9 | 5.38 | 3.29 | 5.5 |
| 10 | 5.51 | 6.14 | 6.9 | 5.37 | 4.20 | 6.6 |
| 11 | 5.52 | 6.13 | 6.10 | 5.36 | 5.20 | 7.10 |
| 12 | 5.52 | 6.12 | 6.10 | 5.35 | 6.20 | 8.16 |
| 13 | 5.53 | 6.11 | 6.11 | 5.34 | 7.19 | 9.25 |
| 14 | 5.54 | 6.10 | 6.11 | 5.33 | 8.20 | 10.34 |
| 15 | 5.55 | 6.9 | 6.12 | 5.32 | 9.23 | 11.40 |
| | | | | | | p.m. |
| 16 | 5.55 | 6.7 | 6.12 | 5.30 | 10.29 | 12.40 |
| 17 | 5.56 | 6.6 | 6.13 | 5.29 | 11.38 | 1.35 |
| | | | | | p.m. | |
| 18 | 5.57 | 6.5 | 6.13 | 5.28 | 12.42 | 2.22 |
| 19 | 5.57 | 6.4 | 6.14 | 5.27 | 1.44 | 3.2 |
| 20 | 5.58 | 6.3 | 6.14 | 5.26 | 2.44 | 3.38 |
| 21 | 5.58 | 6.2 | 6.15 | 5.25 | 3.38 | 4.9 |
| 22 | 5.59 | 6.0 | 6.15 | 5.24 | 4.25 | 4.39 |
| 23 | 5.59 | 5.59 | 6.16 | 5.23 | 5.4 | 5.11 |
| 24 | 6.0 | 5.58 | 6.16 | 5.22 | 5.36 | 5.40 |
| 25 | 6.0 | 5.57 | 6.17 | 5.21 | 6.13 | 6.16 |
| 26 | 6.1 | 5.56 | 6.17 | 5.20 | 6.39 | 6.53 |
| 27 | 6.1 | 5.55 | 6.18 | 5.19 | 7.10 | 7.35 |
| 28 | 6.2 | 5.53 | 6.18 | 5.18 | 7.42 | 8.23 |
| 29 | 6.2 | 5.52 | 6.19 | 5.18 | 8.16 | 9.12 |
| 30 | 6.3 | 5.51 | 6.19 | 5.17 | 8.54 | 10.5 |
| 31 | 6.3 | 5.50 | | | 9.38 | |

## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|---|---|---|---|
| 3 Mar. | ☽ | Last Quarter | 9 9 p.m. |
| 11 ,, | ● | New Moon | 6 36 p.m. |
| 18 ,, | ☾ | First Quarter | 5 41 p.m. |
| 25 ,, | ○ | Full Moon | 5 46 p.m. |

Apogee, 4th March, at 2·54 p.m.
Perigee, 18th March, at 12.24 a.m.

The planet Uranus will be passed about 9 p.m. on the 12th at a distance of about 5 diameters of the Moon.

As soon as twilight fades on the 14th Venus and the crescent Moon (at a distance of 8 degrees to the left), will afford an interesting spectacle as they draw near to the western horizon.

The Moon will pass Jupiter on the 15th at 8 a.m. and it will be noticeable in the early evening before they set that the Moon will be above the planet to the eastward.

Mars will be passed on the 19th about 3 a.m. when below the horizon.

On the 21st the Sun will reach the celestial equator on its way northward and may be said to rise and set exactly due east and due west, affording an excellent opportunity to mark these points.

On the 23rd the Moon will be passing Neptune about 1 o'clock in the morning. Neptune is still apparently near Regulus, one degree eastward, but requires a telescope and is of little interest for general observation. The other planet of small general interest, on account of its distance, Uranus, will be so much in a line with the Sun as to be entirely unobservable, especially on the 28th.

Venus will apparently reach its most eastern position amongst the stars of Aries on the 29th, after which it will seem to move backwards into the constellation Pisces until the 14th of May.

The Southern Cross will be coming into view, about 30 degrees east of south, at an early hour in the evening during this month; its position being nearly horizontal.

| | | | |
|---|---|---|---|
| 2 Apr. | ☽ | Last Quarter | 5 29 p.m. |
| 10 ,, | ● | New Moon | 6 32 a.m. |
| 17 ,, | ☾ | First Quarter | 12 9 a.m. |
| 24 ,, | ○ | Full Moon | 7 37 a.m. |

Apogee, 1st April, at 11 12 a.m.
Perigee, 13th April, at 7 30 a.m.
Apogee, 29th April, at 5 0 a.m.

Conjunctions with the Moon of Mercury on the 9th, Venus on the 10th, and Jupiter on the 11th, will be invisible on account of their apparent proximity to the Sun.

On the 12th Neptune will be only 9 minutes of arc to the north of Regulus, the brightest star in Leo and uppermost in the handle of the Sickle. It will, therefore, be an interesting object for owners of small telescopes all through this month.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

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## Event and Comment.

### Conference of Canegrowers—Minister's Opening Address.

THE Queensland Canegrowers' Association held its Third Annual Conference in March, commencing its sittings in Brisbane on the 19th. The Chairman, Mr. George Johnson, presided over a large and representative gathering of producers from all sugar districts of the State. It was fitting, he said, that Mr. Forgan Smith, the Minister for Agriculture, who was responsible for the Act under which their organisation was created, should declare the conference open. In the course of his inaugural address Mr. Forgan Smith said:—No doubt during the proceedings of this conference you will review the history of the past four years, take stock of your achievements, and review your future plans. However, I am satisfied that the canegrowers' section of the Queensland Producers' Association has justified its existence, and has long years of usefulness awaiting it in the years to come. The sugar industry plays a prominent part in the life of Queensland as a State. It is a most important agricultural industry, it affords a great amount of employment to a large body of our people, and in addition to that it is one of the main industries on which our White Australia policy is based. There are still in our midst unfortunately, in some parts of the Commonwealth, people who, while giving lip service to the White Australia ideal, would like to see some of our industries carried on under standards not compatible with white men's standards in any free community. I mention that to indicate that by the White Australia ideal we not only lay down as a Commonwealth policy something to ensure the purity of our race, but also to provide that the economic conditions for those engaged in those industries should be made such that the standards of comfort which white men and women have a right to expect should be maintained. I am called

upon to make these remarks on account of the agitation which arises from time to time regarding sugar prices and so forth, and also the intimation in the press within the last few days that certain interests are moving in the direction of having bananas produced by coloured people of other countries introduced into Australia. As the case for the home production of bananas is strong, so the case for the production of sugar is equally strong.

## Review of the Sugar Industry.

IT is interesting to review the figures relating to the industry and realise what is involved from the point of view of Queensland in regard to sugar. The total assets are: Mills and refineries, £7,800,000; farms, £16,600,000; a total of £24,000,000 invested in the sugar industry in Queensland. The area under cane comprises approximately 300,000 acres, and the number of registered farmers engaged in the industry is 7,300. It gives employment to 28,000, and its wages bill alone is worth £6,000,000 a year. In addition to that, having regard to the interdependency of all industries, it can be calculated that the sugar industry gives employment for a very large section of the public in addition to those whom I have mentioned. It is estimated that directly and indirectly in Queensland the industry benefits 100,000 persons. The area under cultivation has increased in thirteen years from 161,195 acres to 274,838 acres. In the course of the same period the production of sugar has increased from 225,847 to 485,745 tons, and last year the total production was 515,130 tons, indicating a remarkable extension and showing to some extent the productivity of this State and the capacity for further expansion of the industry if suitable markets were available. On the question of production, I might state, as Minister for Agriculture, that the problem of surplus production is one that gives great concern each year. Your organisation and other organisations have dealt with this problem at various annual conferences, and various schemes have been put forward individually and by certain sections of the industry. Up to the present it has not been possible to secure anything like complete unanimity on any proposal, nor has any scheme been put forward that does not carry with it, as its inevitable accompaniment, certain serious economic dangers. In other words, one must review the industry from the point of view of the whole of the State and the Commonwealth, and where possible devise a scheme that will give justice to the grower, and at the same time do nothing that will affect the economic balance of the industry as it affects the national well being. As far as I am concerned, and the Government is concerned—it is not my purpose to refer to any of the proposals that you have on your agenda paper dealing with this problem—but I am authorised to say that any definite, concrete scheme that may be submitted and adopted at this conference, having for its object the control of the industry in an orderly manner and beneficial to the State as a whole and to the growers, will receive the very careful attention of the authorities in the State. In common with the other authorities, the Queensland Government has been making representations for improvement in the duty overseas with a view to helping you in the direction of a better price for your surplus product. So far as we have got to at present the preference duty given to sugar is insufficient to meet your requirements. Naturally, one cannot view with equanimity the continually growing surplus. It is a question surrounded with great difficulties. Various schemes have been tried in other countries, and some have been abandoned because they have broken down under the economic circumstances of production. However, if your conference, as representing the industry, can put forward a scheme relating to this matter which will achieve this purpose then we will be in duty bound to give every consideration to it.

## A Charter of Control.

AGAIN, on the control side of the industry you have certain very important legislation. You have the Act of Parliament under which your organisation functions. In some quarters I notice that is being assailed. Certain people have put forward the idea that the Q.P.A. as an organisation statutorily established could be reviewed from a certain standpoint. I do not wish to go into any detail about the arguments that might be put forward for and against this form of organisation, but I do wish to impress this point on growers and others concerned that there must be some sound advantage to accrue to an industry that is given certain statutory authority that enables them to control their own industry. That is the point I wish to make. You are under your own Act, you are given a charter to control

your own industry to an extent that does not exist in any other State in the Commonwealth, and if that control is used with wisdom it must give the farmers definite benefits. Obviously no Government can do for an industry, or for an individual, what they should do for themselves. We can simply supply you with the machinery and the authority to do things. How you do those things depends on your own intelligence, on your own capacity, and the influence you exert on your fellow members. I would be very chary, if a member of this organisation, about supporting any activity that would reduce the authority and the powers you are able to operate under your own charter and your own statute.

## The Benefit of the Cane Prices Act.

ANOTHER measure which affects your interests is the Cane Prices Act, an Act which, it is estimated, has benefited the grower considerably. Payment for cane by analysis has undoubtedly been responsible for much increased efficiency on the producing side. Under the system of computation now established, as against former methods, canegrowers benefited during the 1927 season alone to the extent of £630,000. It would be interesting to work out the figures obtained by the new method and the method adopted prior to this Act and see how much the grower has benefited directly and indirectly as a result of this legislation.

## The Science Side of the Sugar Industry.

THE Sugar Experiment Stations Act is another measure with an important bearing on the efficiency of the industry. The amount of cane required to a ton of sugar is being gradually reduced. Sometimes it is claimed that it is entirely due to improved milling facilities, but I think the improvement in the efficiency extends all round. It is due to improved methods of cultivation, improved varieties of cane, and the improved standard of work in the sugar-mills. All sections have participated in the work of building up this industry to the standard it has attained. Last week, in Mackay, there was a conference of sugar technologists called by my department. Certain mills did not send delegates because, perhaps, of a suspicion that there was some nigger in the wood pile, some purpose in the mind of the Minister for Agriculture that has not been revealed. I want to say no such purpose was in my mind. Certain people may endow me with Machiavelian proclivities with regard to certain lines of policy, but my desire was to call together the trained men of the industry who would be capable of discussing technical matters affecting the mills of Queensland with a view to arriving at something to assist one another in coping with collective difficulties. All highly organised industries at the present time realise the importance of the scientific and technological side of their activities and the sugar industry would be well advised to build up a technological staff on the highest scale possible. Every aid that science and modern invention and improved methods can bring to any industry should be welcome and readily adopted. I am pleased to say that that conference was a distinct success, and a Queensland branch of the International Bureau of Sugar Technologists was subsequently launched in Mackay, and I am satisfied that in the future it will render very valuable service to the sugar industry. I hope when the next conference comes round that every mill in Queensland will be represented by one or more experts, who will persist in the work of elucidating the problems which affect the industry. It is also intended to build up the Bureau of Sugar Experimental Stations with a view to giving greater aid to the industry than has been possible in the past. Tangible evidence of its value is apparent, and it is pleasing to note the confidence that Mr. Easterby and others associated with him have been able to build up in all sections of the industry. As new problems develop you may rest assured that the bureau will be eager and willing to help in the solution of the many difficulties. That is as it should be. One of the most important functions, I consider, of the Department of Agriculture is to co-operate with the various activities in the agricultural life of the State, and help in co-ordinating the work of the various scientific organisations throughout the Commonwealth and thus throughout the world.

I wish you success in your conference, and in your industry, and if, as a result of your deliberations, some improvement can be effected to the industry in Queensland you will have achieved a very important national purpose. When you conclude your deliberations if you desire to put anything before the Government, by way of deputation, I will be pleased to arrange a meeting place where those resolutions can be discussed.

# Bureau of Sugar Experiment Stations.

## THE VALUE OF FERTILISERS FOR SUGAR-CANE.

### REVIEW OF THE RESULTS OF SOME EXPERIMENTS AT SOUTH JOHNSTONE IN 1928.

The value of fertilisers as an aid in the reduction of production costs has always been emphasised by the Bureau. At the same time it has been pointed out that it is necessary to determine, by careful field experimentation, the exact manurial requirements of the crop, in order that the money laid out in purchase of fertiliser may be spent to the best advantage.

It is with this in mind that the farm experimental trials have been initiated this year. We hope that these tests will supply much of the information needed to enable us to make a definite recommendation as regards the fertiliser requirements of our various soil types existing under widely different climatic conditions.

Hence it must be stressed that results obtained on our Experiment Station at South Johnstone will not be applicable on all sugar lands in Queensland. Indeed, the conclusions which might be drawn, from trials made there, may have only limited application on other soil types in the Innisfail or far northern areas.

However, it will be explained how the fertiliser requirements of certain soils under a definite set of climatic conditions may differ from one another in degree only; the need for one or more plant foods may be uniformly felt, due to the dominating influence of climate. This state of affairs undoubtedly holds in the wet tropical belt north and south of Innisfail. For this reason some of the results obtained on the South Johnstone station during the past year will be emphasised.

The soils in this coastal area north of Townsville are favoured, in general, by an abundant rainfall. The excessive water which the land receives in the wet season is not held by the soil. Part is removed as surface drainage, while the remainder is drained away by percolation into the subsoil. The continued leaching to which the soil is thus subjected brings about the removal of large amounts of lime, potash, and other important plant foods, and very often results in the production of an acid soil.

Many of our northern lands are found to exist in this acid condition, even in their virgin state. That they are able to produce very good early crops is due to the available plant foods which are set free when the soil humus is decomposed. This process is stimulated by the clearing of the land, and particularly by any cultivation operations which are performed. The low supply of easily decomposed humus, which is characteristic of these soils originally, means that after a few crops have been removed the soils are very considerably reduced in their productive power. If heavy crops are to be obtained once more, it is essential that certain deficiencies must be made up, so that the cane plant may have the desirable medium in which to carry on its life processes most efficiently.

The first essential is that the lime deficiency be corrected in order to destroy the acid state of the soil. With a lack of available lime, and consequently a sour condition in the soil, the plant functions under a great handicap. Very often the addition of lime alone to the soil so improves growing conditions generally that the crop response is very marked. This is well illustrated by results obtained on the South Johnstone station this past year. The soils on the station, in common with so many more in the Innisfail area, are very decidedly sour, and it was expected that the response to lime would be very appreciable. The results obtained were as follows:—

LIMING EXPERIMENT (PLANT CANE).

| | Tons cane per acre. |
|---|---|
| No treatment plots .. .. .. .. .. .. .. | 32.9 |
| One ton burnt lime per acre harrowed in before planting .. .. | 39.1 |
| Gain due to liming .. .. .. .. .. | 6.2 |

We find, then, that a gain of 6 tons of cane per acre resulted from the treatment. There can be no question that the added return from the plant crop alone shows a

very handsome profit. Reckoned at 25s. per ton net for the extra 6 tons, the return was £7 10s. To purchase and apply 1 ton of lime should cost less than £4. The beneficial results will, moreover, be lasting in their effect, and increased returns will certainly follow right through the succeeding ratoon crops.

The extent of the improvement in yield due to a lime application on this soil would have been shown still more definitely, had fertilisers been employed uniformly over the entire field, on both limed and unlimed plots, for a goodly supply of lime is necessary at all times if the maximum returns are to be obtained from manuring.

The second important experiment was that of the application of a heavy dressing of superphosphate. It is well recognised by agricultural scientists that an acid soil is usually deficient in phosphates. The acid condition of the soil favours the leaching away of this important plant food, so that the soil tends to become depleted. The dressings in this experiment were applied at the rate of 1,000 lb. of superphosphate per acre. Now there are few farmers in Queensland who would think of applying 1,000 lb. of mixed fertiliser per acre, far less this amount of superphosphate alone. Let us study the increased yields due to the treatment, and their value to the grower:—

Superphosphate Experiment (1st Ratoons).

| | Tons cane per acre. |
|---|---|
| No treatment plots .. .. .. .. .. .. .. | 24.1 |
| One thousand pounds superphosphate per acre, at ratooning .. | 33.8 |
| Gain due to manure .. .. .. .. .. .. | 9.7 |

The gain due to the use of superphosphate was 9.7 tons of cane per acre; allowing a net value of 25s. per ton—a decidedly low value—the added return was 9.7 × 25s., or £12 2s. 6d. per acre. One thousand pounds of superphosphate would cost about £5 in Innisfail, and allowing as much as £1 for applying it, the net profit is still in excess of £6 per acre. Certainly an extra return of £6 per acre on a 50-acre harvest would appeal to most of our Queensland canegrowers. And, further, the benefits do not stop here. It has been shown by chemical analysis that a 40-ton crop of cane would take up about 70 lb. of phosphoric acid from the soil. Of this amount, 50 lb. are permanently removed in the cane which is sent to the mill, while the remaining 20 lb. are returned to the soil when the tops and trash are burned.

Now the 1,000 lb. of superphosphate contained 200 lb. of phosphoric acid, and only 50 lb. of this were removed in the crop. Hence, besides returning a very decided profit, the added effect of a permanent addition to the plant food supply of the soil was brought about—a process which alone makes for permanent agriculture.

These are but two examples of what might be done by treating soils with individual plant foods of the necessary type. It is not possible to calculate what would have been the result had the application of both lime and superphosphate been made on the one plot of land. Certainly the crop would have been considerably in excess of even the 39-ton crop obtained from lime alone.

The results bear out the prediction which has been stated repeatedly by the writer—that the amounts of fertiliser which might profitably be employed on both plant and ratoon crops, in many of our northern areas, is in excess of half a ton per acre per year. But let it be emphasised once more that the only sure way in which the true manurial requirements of any soil type may be fully known is to carry out a small, well-planned field trial on the particular type of soil on which the results are to be employed.

In conclusion, it might be not altogether unnecessary to attempt to dispel an erroneous idea which seems to linger in the minds of many growers regarding the results obtained from experiments on our stations. The defence often set up, to justify their not following the results we have shown, is that the care which our lands receive could not possibly be given under average farm conditions; and the extra cultivation is in a large measure responsible for the good results. The fallacy of this argument is very apparent; for in all experiments, such as those described, the difference in yields is due to the fertiliser treatment exclusively, as the same careful cultivation is received alike by both treated and untreated plots.

It is true, however, that clean fields are necessary in order that maximum returns may be obtained from the use of fertilisers; for weeds are only too ready to use the manure intended for the cane, and it is not profitable to fertilise both crops.

# THE POSITION OF THE SUGAR INDUSTRY.

By H. W. KERR, M.Sc., Ph.D., Acting Director, Bureau of Sugar Experiment Stations.*

We are all well aware of the difficulties which are confronting the sugar industry the world over, and we in Queensland have not escaped the touch of deflated sugar values, which are causing the greatest uneasiness amongst all the sugar-growing countries of the world. There is probably no country to-day except Java which can produce sugar profitably at the present market price, and many and varied efforts are being put forth in an attempt to curb the increasing production which proceeds at a rate faster than that of increased consumption.

The present indications are that no hope can be entertained for improved sugar prices in the near future, as a large surplus continues to flood the world's markets.

Several schemes have been put forward from time to time, but growers have not yet succeeded in becoming unanimous on a method by which curtailment of plantings could be achieved successfully and justly.

Another alternative has been to attempt to obtain increased preference on sugar imported into Britain from Australia, and we hear much agitation for greater trade reciprocity within the Empire. But setting aside for the time being those matters which involve the invocation of outside aid, growers might seriously consider the question, "Have we done all in our power, by the adoption of the best methods of cultivation, by the use of adequate fertilisers applied in the right way and at the right time, and by growing those varieties which are best suited to our lands—have we done all we can to reduce production costs to a minimum?" In a country such as Queensland, where the standard of living is high, we must maintain a proportionately high degree of efficiency in order that we may continue to enjoy these privileges.

## The Efficiency of the Queensland Sugar Industry.

We have heard considerable controversy in the past few months regarding certain statements contained in the annual report of the Director of the Bureau of Sugar Experiment Stations. It is true that some of the facts which it disclosed do not reflect the utmost credit on the efficiency of our methods. But I would take this opportunity of saying, in answer to outside criticisms, that our Queensland sugar industry is no less efficient than many other industries, both primary and secondary, which also enjoy privileges comparable with those bestowed upon the canegrower.

At the same time we must not lose sight of the fact that it is incumbent on us to continue our forward march, and demonstrate that a protective tariff does aid in development and the search after efficiency, and is not an obstacle in the path of progress.

Efficiency must be measured in terms of a comparison between our present results and the results which we might achieve, with the facilities we possess, and under the difficulties which confront us. It was never suggested that Queensland growers could achieve anything like what has been accomplished in Java, for instance, but I feel sure that there is, in certain of our areas at least, quite considerable scope for improvement.

## Intensive Cultivation.

The principle of intensive cultivation in our sugar industry is so ardently advocated by us, because it means the maximum net return for labour and money expended in producing the crop, and I feel sure that you have in this Bureau an organisation which can afford you considerable assistance in achieving this end. The activities of the Bureau have been handicapped in the past, due to its having to function with a staff scarcely adequate for the work in hand. The return of the three Government research scholars from abroad has added very considerably to the strength of the personnel, and, if I may say, as one of them, the opportunities which they have had in their travels have afforded them a very intimate acquaintanceship with the experiences of the leading canegrowing countries of the world, the problems which have confronted them, and the manner in which they have been solved.

## Reduction of Production Costs.

The ultimate aim and object of the Bureau must necessarily be to aid growers in reducing production costs. And, so far as agricultural methods are concerned, it has been proven in Java, Hawaii, and elsewhere that the most successful method of

* In an address delivered at a Conference of the Queensland Canegrowers, Brisbane, 21st March, 1929.

solving the difficulties is by means of field experimentation on a wide scale. We feel that this phase of the work is of such importance that it will constitute the major project of our agricultural division for many years to come. With this object in view a scheme has already been launched in Queensland, and I am pleased to say our early experiences have convinced us of the practicability of the method.

### The First Objective.

Our first objective is a determination of the fertiliser requirements of our various soil types. We know that much can be achieved by the judicious use of the correct fertilisers, but we do not at present possess the desired knowledge which would enable us to declare just what are the fertilisers which will yield the maximum returns under our varied conditions of soil and climate. Hence we have planned for the setting out of about sixty fertiliser trials, to be distributed throughout all our mill districts, as an initial effort. Preparations for this work are well in hand, and we have already set out four of these trials in the Bundaberg and Childers districts. Our plan is to select a field which is about to be planted, and which carries a soil type of major importance in that particular area. The grower whose land has been chosen is one who is keen and appreciative of the value of this type of work, and who will give the trial the care which its importance demands. Further, we have attempted to select men who command the confidence of their neighbours whose lands possess soil of a similar type. The planning of a trial which should yield the maximum of useful data is made by ourselves, and we also carry out the work of laying out the plots, applying the fertiliser, and making observations on growth and growing conditions. Later, the supervision of harvesting operations will also be carried out by our officers, and the co-operation of the various mills has been assured with regard to the weighing and analysing of the produce from the individual plots. It has been our plan to ask the grower to provide the fertiliser necessary for the trial, and the ready response to this requirement has convinced us of the interest which growers are prepared to take in this experimental work. This is very gratifying to us, and should go far towards ensuring the success of the project.

However, I am very pleased to announce at this time that the fertiliser companies are also very appreciative of the value of our efforts, and altogether about £300 worth of the required materials have been placed at our disposal, which will provide for all our trials for this year. This fertiliser will be passed on to the growers who are co-operating with us, as a contribution from the fertiliser suppliers, in return for any added labour which the experimental trial may impose upon them.

### Farm Experiments.

Naturally, the extent of the work which can be successfully initiated in one year is limited, and it is appreciated that many growers who would willingly take up the work with us must be disappointed for the time being. However, as the number of trials will be added to from year to year, it is hoped that before long all interested will have an opportunity of securing a trial on their farms. In about three years' time we expect to have about 200 farm experiments under way, and the value of the results secured on such a wide scale will be very evident.

### The Future Work of the Bureau.

Our future work will not be confined to fertility trials alone, but we will extend the scheme so as to embrace all phases of experimental work—variety trials, cultivation tests, &c., which will aid growers in their pursuit after increased efficiency.

I hope it will be fully appreciated that the Bureau is making a determined effort to assist growers with their difficulties, but we can of ourselves do nothing without the full co-operation of the growers. I give you a full assurance of our readiness to serve; will you in turn pledge your support of this very important field of investigation.

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

# CANE PEST COMBAT AND CONTROL.

*Mr. E. Jarvis, Entomologist to the Bureau of Sugar Experiment Stations, has submitted the following report for the period February to March, to the Acting Director of the Bureau:—*

## Insects Having a Good Time.

During this period of the year, when wet conditions combined with high temperatures are being experienced in the district of Cairns, insect life of all sorts is unusually abundant.

In addition to the large variety of insects damaging sugar cane, bananas, fruit trees, and many kinds of vegetables, the residents of this portion of Queensland are also exposed to personal attack from the various blood-sucking and other objectionable species commonly occurring in the tropics.

Although the chief object, of course, of the Sugar Bureau in issuing reports of this nature is to forewarn growers of the probable appearance of those insects thought likely (by the Entomologist) to cause trouble each month, it is also proposed to deal very briefly from time to time with the control of the principal noxious species which indirectly affect the health and activities of our cane farmers.

Just at present, grubs of the "greyback" cockchafer are enjoying the congenial climatic conditions brought about by alternate heat and generous showers; which bid fair, if continued during April, to ultimately favour their transformation into the pupal or chrysalis state.

Convincing evidence of the work of this formidable cane-beetle will gradually become apparent through April and May on many areas which during the last two or three years have either been slightly infested by or practically free from grubs.

## Cane Pests Causing Trouble During the of Month of April.

1. Grubs of "greyback" cockchafers (eating the roots).

2. "Beetle borer" (tunnelling in the sticks).

All grubs of the "greyback" will now be in their third or last stage of growth, and feeding vigorously on the main roots or basal portion of the cane sticks.

To make sure that this final development has been reached, the grower has only to measure the width across the hard brown head of one of these grubs, which will be found to be exactly ¾ of an inch. In fields where they happen to be very numerous one cannot go wrong in collecting them during ploughing operations; since the value of this commonsense control method is recognised and practised whenever possible by farmers in other countries.

## What About the Weevil Borer?

This beetle, although of secondary importance as a cane pest, must not have its activities overlooked. Its mere presence here and there in the butts of canes need not, however, cause alarm, unless such crops be destined to stand over to the next season before being cut.

Much good can be achieved by the owner himself, if he would take the trouble to find out the degree of an infestation by laying down bait-traps in the manner described in my hints for last month (March). In cases where few beetles are found in the traps, and the cane is about fully grown, it only remains for the grower when harvesting same to insist on low cutting; and the subsequent milling operations will do the rest by crushing all the living beetles with their grubs and pupæ contained in the canes.

## Farmers' Interest in Pest Control.

It is often wondered when the interest of the farmer will be fully awakened in our insect pests of cane and their control, and he will ask himself the question—"Why should these grubs or caterpillars be allowed to work their destructiveness unmolested by *me*, and spoil the ultimate result of the trouble and expense I have gone to, in thorough preparation of the ground, manuring, and clean cultivation of same?"

Why, indeed, when the grower holds the solution of the difficulty in his own hand, and can, if he chooses, prevent such depredations. Any farmer wishing to know how to successfully fight his insect enemies of cane should apply at once to the Entomologist at Meringa Experiment Station for assistance.

## CANE PESTS AND DISEASES.

*Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report for the month ended 12th March, 1929, to the Bureau of Sugar Experiment Stations:—*

### Greyback Grubs now in the Third Stage.

Field observations made during the last day or two show that most of the grubs of this destructive insect have entered the third and final grub stage. It is from the present time, and until about the end of next June, that the most serious injury of cane roots will take place. Actual leaf indications, such as yellowing or wilting, may not show for some weeks yet, although the grubs are active all the time.

These are the resultant grubs from the eggs that were laid by the beetles during last December, the intermediate time having been occupied in the egg, and first and second grub stages. During these two stages very little actual injury is done to cane roots, the grubs subsisting principally on humus obtained from the continual ingestion of soil. Laboratory experiments have shown that this season practically all the beetles had ceased laying eggs by the first week of January. From fourteen to seventeen days are normally occupied during the incubation of the eggs, so that by the main bulk being deposited between the 14th and 25th December, many young first-stage grubs were in evidence about the first week in January. Periods varying in duration from four to five weeks were required by these grubs before changing into the second stage, which this season was reached in the majority of individuals by the first week of February. A slightly longer time elapses before the next moult into the third stage takes place, thus making the time spent in the second stage between five and six weeks.

It is an interesting fact that during the whole of any particular grub stage, the size of the grub's head does not alter, although the body increases considerably in size. Whilst in the first two stages the grubs are usually to be found about a couple of inches below the surface of the soil, unless the weather is unusually dry. As before stated, until they arrive at the third stage, their food consists mostly of humus obtained from the soil; certainly in the first stage this is so, and may be supplemented in the second stage with fine grass roots or the smaller and more tender cane roots.

As is unfortunately too well known, during the third stage the tables are turned, the grubs' diet consisting almost wholly of roots, &c. It is at the present time, before grub damage is apparent through the wilting of the cane, that growers should attempt fumigation.

### Fumigation of Cane with Carbon Bisulphide.

For obtaining the best results possible from the use of this fumigant, two main things are necessary:—(1) Suitable weather conditions; (2) intelligent application of the bisulphide. This fumigant is extremely volatile, and the fumes being heavier than air, have a tendency to penetrate downwards into the soil. It is therefore essential that during the time of fumigating the soil be fairly free so as to allow the maximum penetration of the poison fumes. It can, therefore, be clearly seen that it would be utterly useless to attempt fumigation immediately following heavy or soaking rains. Several days should be allowed to elapse until such time as the ground is less consolidated and water-logged.

When handling bisulphide, great care should be exercised that it does not come into contact with fire, as it is not only highly inflammable but also explosive.

As already pointed out, the fumes of this material have a tendency to work downwards, therefore it is in this connection that the intelligent application of the bisulphide exists. Before treating a block of cane, a good general "depth survey" should be carried out. This means digging at a few stools throughout the affected area in order to ascertain the depth at which the grubs are situated. This discovered, the doses of poison should be applied to a depth slightly less than that at which the grubs were located. With ordinary sized stools two doses of fumigant are usually sufficient; one on each side of the stool. If, however, any very large stools are encountered, three doses placed equidistantly round the stool should be enough.

### Method of Injection with (A) Dank's Injector, and (B) Vermorel Injector.

(A) The Dank's Liquid Soil Injector consists of a brass container, above which are two wooden hand-grips, one on either side; a plunger with a dose regulator around it in the form of a graduated collar. Below the container is a long spear with an adjustable footplate, below which again is a small aperture through which

the doses are ejected. Each dose is measured mechanically inside the Injector, and with each downward stroke of the plunger one dose is delivered.

The usual dose given is ⅛ ounce, or ¼ ounce per stool (i.e., two ⅛ ounce doses, one on each side of the stool). To obtain this, set the little pin in the graduated collar which is round the plunger stem, to "6." When applying the doses, do not insert the spear into the middle of the stool. Insert it into the ground some 2 or 3 inches from the stool, taking care to have the dose aperture directed towards the plant. Press the plunger down sharply. The depth adjustment for the doses is obtained by setting the distances between the lower side of the footplate and the dose aperture, to whatever is required, i.e., 2, 3, or as many inches as are necessary.

(B) The Vermorel Liquid Injector is very similar in appearance and construction with the Danks; the principal points of difference, however, are in the regulation of doses, and the fact that the expulsion chamber (not aperture) is attached just below the container tank, and independently from the upper portion of the spear.

Regulation of doses is effected by removing the split pin in the plunger cap, taking off the cap, and then slipping on to the stem or piston the brass rings which are supplied with the machine. The effect of this regulating is as follows:—Without any rings added, one downward stroke of the plunger delivers .36 or just over one-third of an ounce of liquid.

| | | |
|---|---|---|
| With one ring added | .32 oz. | approximate. |
| With two rings added | .29 oz. | |
| With three rings added | .25 oz. | |
| With four rings added | .22 oz. | |
| With five rings added | .18 oz. | |

This latter dose is approximately one-sixth ounce.

As five is the total number of rings that are supplied with this injector, therefore ⅛ ounce is the minimum dose that can be obtained. This is slightly in excess of the minimum dose that can be obtained from the Dank's Injector, but the difference, although it takes slightly more material to treat an acre, is really hardly worth considering. Should, however, still smaller doses be required, no doubt a couple of extra rings could easily be made or procured.

It has been occasionally reported that immediately following fumigation, an excellent percentage of "killed" grubs has been obtained, but some weeks later some grubs have again been observed attacking the same cane roots, naturally leading to the belief that some of the grubs had recovered from the effects of the poison. In isolated instances where a grub has been just outside the range of the dose of poison at the time of fumigating, it would certainly survive, but the explanation given is that the "new invasion" is caused by the grubs that were feeding at the weed and grass roots between the cane rows, having travelled to the cane stools.

The actual period during which the bisulphide is able to kill the grubs is within the first twenty-four hours after application; therefore if these grubs reached the cane roots some days after fumigation, they would not be affected. Such a recurrence of grubs is preventable by having the spaces between the cane rows free from weeds, &c., for some little time before fumigation is actually carried out. This could be done say a week beforehand, then by that time the grubs would probably all be concentrated at the cane roots, and would therefore come under the influence of the poison.

Supplies of carbon bisulphide for fumigation are available to growers in the Mackay district, at a reduced rate of cost, on application to the Secretary of the Pest Destruction Board. Injectors, too, are also available through application to the same institution.

**Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.**

# INSECTICIDES*

By ROBERT VEITCH, B.Sc., Chief Entomologist.

The preceding chapter might be regarded by some readers as being of interest rather than of practical importance to growers. Such, however, is not really the case, for many points dealt with therein have an important bearing on the measures that may be adopted in combating insect pests, e.g. the varying structure of the mouth parts. The present chapter is, however, severely practical for it deals with the all-important subject of insecticides.

Insecticides are chemicals used in the control of insect pests. Their function is to kill the insect to be controlled without, at the same time, causing any appreciable degree of injury to the plant or animal host on which it is feeding or without injurious effect on the medium in which it may be feeding or breeding. Further important considerations in the choice of a chemical as suitable for insecticidal purposes are—firstly, its cost and method of application, which must be such that its use is economically sound and practicable; and secondly, its safety, in that it must be capable of being employed without danger to the operator when reasonable precautions are observed in its application.

The chemicals used as insecticides may be classified in three groups —firstly, stomach poisons; secondly, contact insecticides; and thirdly, fumigants. The choice of the particular class of insecticide to be employed in combating an insect epidemic will be determined partly by the conditions under which the pest is operating and partly by the feeding habits of the insect to be controlled.

## Stomach Poisons.

As has already been pointed out in an earlier chapter many insects injure their host plants by actually biting off and swallowing portions of the foliage, fruit, or stalk of the plants on which they are feeding. Typical insects in that category are the army worm, the codling moth, the corn-ear worm, the cutworm, the fig beetle, the leaf-eating ladybird, and the pumpkin beetle.

The first four insects just mentioned pass through larval stages possessing chewing mouth parts which enable them to nibble off portions of the foliage, fruit, or stem of the attacked plants. The other three insects referred to possess chewing mouth parts, both as larvæ and beetles, and hence are destructive in two of their four life cycle stages, whereas the others are destructive in one only, the moths being incapable of injuring any part of the plant.

Spraying or dusting their food plants with poison is the control measure generally employed in combating the type of insect now under discussion. Some of the species, however, are more effectively controlled by the use of baits containing suitable poisons. On swallowing a certain amount of the poisoned food or bait, death rapidly ensues. For obvious reasons the materials used in this manner are referred to very appropriately as stomach poisons.

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.R.S., and J. H. Simmonds, M.Sc., published by Department of Agriculture and Stock (Brisbane).

The insecticides belonging to this class are nearly all some form of arsenic which must conform to two conditions—firstly, it must be practically insoluble when made up into a spraying mixture, otherwise serious burning of the sprayed foliage will ensue; and secondly, it must be soluble in the digestive juices of the stomach so that it may be absorbed with fatal results to the insect that has fed on the poisoned plants or baits. When the insecticide is employed in the preparation of a poison bait only the second condition need be taken into consideration.

Arsenate of lead, Paris green and poison baits containing Paris green are later discussed in detail as being the most effective and most commonly employed representatives of this type of insecticide.

### Contact Insecticides.

The earlier discussion of insect-feeding habits also showed that although many insects injured their host plants by chewing the foliage, fruit, or stem, another very important group was responsible for damage by piercing the epidermis or skin of the attacked plants and by extracting the plant sap through the punctures which they had made by means of their piercing mouth parts. In this class of insect the mouth parts are so developed that they are quite incapable of chewing, and their feeding is restricted to sucking plant sap just as a mosquito sucks the blood of humans. When the feeding habits of these sucking insects are considered, it is evident that it would be useless to attempt their control by arsenical sprays spread over the surface of their food plants. The surface tissue is never eaten by this type of insect and hence the poison would not be swallowed.

Stomach sprays of the arsenical type being impracticable for sucking insects assistance must be obtained from another class of insecticide, and it has been found that what are known as contact insecticides are very effective for the control of these sucking insects.

Contact insecticides owe their killing properties to a number of factors. The mortality produced by their application may be due to their corroding influence on the bodies of the insects covered by the contact sprays. They may suffocate the insect by the closure of the pores through which it breathes or, on the other hand, death may ensue as a result of the more volatile portions of the insecticide passing in through the breathing pores of the body.

Insects against which contact insecticides may be employed are well represented by the scale insects and aphids.

Kerosene emulsion, resin wash, miscible oils, nicotine sulphate, and lime sulphur are later dealt with in some detail as typical representatives of contact insecticides.

### Fumigants.

Reference must now be made to the third class of insecticide—namely, fumigants. Fumigants may be employed against both the chewing and sucking type of insect, but difficulties are frequently encountered in their use and generally, but not invariably, they are employed only in enclosed spaces. Fumigants produce gases which kill by entering the breathing pores of the insect body and destroying the tissues or by suffocation following on the removal of oxygen.

The fumigants most commonly employed in Queensland are hydrocyanic acid gas and carbon bisulphide; detailed discussion of fumigants will be confined to these two insecticides.

### Arsenate of Lead.

Arsenate of lead is without doubt the most suitable and the most popular form in which to use arsenic as a stomach poison on insect infested foliage. When mixed for spraying it settles slowly in the mixture and it adheres longer to the foliage than other stomach poisons such as Paris green. Further points in its favour are the fact that it does not at all readily burn the foliage, and its presence can easily be detected on the leaves, thus enabling the operator to make sure that the spraying has been complete and effective. It does not kill so quickly as Paris green, but is much safer to use on foliage.

Arsenate of lead may be bought either in powder or paste form. When the powder is used in the preparation of a spray it is essential that every particle should be well moistened before the arsenate of lead is added to the water. A thin paste, free from lumps, is therefore prepared by gradually adding small quantities of water to the powder until it is thoroughly wet. The paste prepared in the manner just described is then poured into the vessel holding the rest of the water to be used in the preparation of the spray.

Various formulæ are in use for arsenate of lead sprays, but one that has given satisfaction as a standard spray is—

| | |
|---|---|
| Arsenate of lead powder .. .. .. | 1½ lb. |
| Water .. .. .. .. .. | 50 gallons. |

If the paste form of arsenate of lead is used the formula must be modified as follows:—

| | |
|---|---|
| Arsenate of lead paste .. .. .. | 3 lb. |
| Water .. .. .. .. .. | 50 gallons. |

Arsenate of lead is also frequently used as a dust instead of a spray, hydrated lime being generally employed as the carrier. Formulæ for the arsenate of lead dust vary from one part of arsenate of lead to ten parts of hydrated lime to as high a strength as one part of arsenate of lead to three parts of hydrated lime. Mention may be made of the fact that quite a number of proprietary dusts containing arsenate of lead are at present on the market.

### Paris Green.

Paris green is much less popular as a spray than arsenate of lead, its lack of popularity being due to a number of factors. Firstly, it settles much more quickly in the spraying mixture than is the case with arsenate of lead, and hence it is difficult to maintain anything like a uniform strength of spray throughout the operation. Secondly, it does not adhere so well to treated foliage and consequently must be applied at more frequent intervals to ensure protection. Thirdly, it is not so safe to use owing to the fact that Paris green may contain an appreciable percentage of water soluble arsenic and such soluble arsenic will burn foliage. That difficulty, however, may usually be overcome by the addition of lime. The added lime combines with the soluble arsenic and reduces the danger of burning the sprayed foliage. Paris green possesses the advantage over arsenate of lead in the rapidity of its effect on insect life.

Paris green used as a spray should be prepared in accordance with the following formula:—

| | |
|---|---|
| Paris green .. .. .. .. .. | ⅓ lb. |
| Quicklime .. .. .. .. .. .. | 1 lb. |
| Water .. .. .. .. .. .. | 50 gallons. |

The Paris green should be worked up into a paste by the addition of a small quantity of water; then the lime should be slacked in a little water and added to the rest of the water. Finally the Paris green paste, which should be free from lumps, is added.

As in the case of arsenate of lead, Paris green may be applied as a dust, hydrated lime again being the ordinary carrier. Various formulæ show Paris green being used in the proportion of one part of the poison to from six to ten parts of the hydrated lime.

### Poison Bran Baits.

Paris green has been referred to as presenting several unsatisfactory features when used as a spray, but in the preparation of poison bran baits employed in the control of such pests as cutworms it gives very good results. The danger of burning foliage no longer operates, and its relatively quick-killing powers render it more effective than arsenate of lead. A further attractive feature of Paris green is the greenish tinge imparted to the bait, thus enabling the operator to determine whether or not the poison has been thoroughly and uniformly incorporated in the bran.

Poison baits may be prepared in accordance with the following formula:—

| | |
|---|---|
| Bran .. .. .. .. | 25 lb. |
| Paris green .. .. .. | 1 lb. |
| Molasses .. .. .. | 1 quart. |
| Oranges .. .. .. .. | 2 fruits. |
| Water .. .. .. .. | 2 gallons (about). |

The Paris green and bran should first of all be mixed together in a thorough manner and while still dry. The molasses and the finely chopped fruit and its juice should then be added to some of the water. The water containing the molasses should next be mixed with the bran and Paris green and the whole should then be well stirred up, enough water being added to produce the right consistency.

It is highly desirable that the poison bait should be of the right consistency, and only sufficient water should be added to permit of it being in a crumbly state and thus capable of being easily scattered broadcast on the ground. It should, at the same time, be sufficiently moist to permit of each flake of bran taking up its quota of Paris green and molasses.

Neither the fruit juice nor the molasses is essential in this bait, although they are usually considered desirable. Horsedung and sawdust have been substituted for the bran in certain formulæ, and smaller percentages of Paris green have also been used, but it is desirable to adhere to the formula given until such time as experiments have demonstrated the equal efficiency of cheaper formulæ when used in this State.

It should hardly be necessary to add that poultry and other domestic animals should not have access to areas that have been treated with poison bran baits.

## Kerosene Emulsion.

Kerosene emulsion is one of the oldest insecticides employed against aphids and scale insects, but its use is now less general than was formerly the case. It possesses, however, one considerable advantage in the fact that all the ingredients required for its preparation can be readily obtained in any centre.

A common formula for the stock solution is as follows:—

| | |
|---|---|
| Hard soap | ½ lb. |
| Water | 1 gallon |
| Kerosene | 2 gallons |

The soap should first be dissolved in the water by boiling and, while the water is still hot, the kerosene should be added to it, but not in proximity to the fire. This mixture should be churned up violently by means of a small spray pump for about five or ten minutes. A good emulsion without trace of free oil should then be available. It is essential that the oil should be thoroughly emulsified because, if free oil is present, burning of the foliage may ensue. Soft water or rain water should be used in the preparation of kerosene emulsion, but if only very hard water is available it can be broken with lye. The stock solution prepared in the manner just described will keep for some considerable time, but some authorities maintain that it is preferable to prepare fresh quantities as required.

When required for use, the stock solution should be diluted by the addition of water. The proportion of water added will depend on the nature of the insect to be controlled, and also on the sensitiveness of the plant to be sprayed. Some authorities maintain that one part of the stock solution to fifteen parts of water is the highest strength at which foliage should be sprayed, while other investigators recommend a strength of one part of stock solution to ten parts of water and even less.

Mention has been made of the necessity of having the oil thoroughly emulsified to avoid the danger of burning the foliage. Attention has also to be directed to the fact that if much emulsion runs down the trunk of sprayed trees serious injury may be caused at or below the ground level. This danger may be avoided to some extent by building up a cone of loose earth at the base of the tree to be sprayed. Such a cone, 9 to 12 inches high and about 12 inches wide, will absorb an appreciable proportion of the surplus kerosene emulsion that runs down the trunk of the tree. After the tree has been sprayed the earth cone should be scraped away and, if necessary, the unsprayed portion of the trunk should be given a light spraying.

## Resin Wash.

Resin wash is a spray that has enjoyed a considerable amount of popularity when employed against scale insects attacking citrus trees.

A formula recommended in New South Wales is as follows:—

| | |
|---|---|
| Caustic soda, 98 per cent. quality | 5 lb. |
| Resin | 16 lb. |
| Soft soap | 6 lb. |
| Water | 100 gallons |

The wash is prepared by boiling 10 gallons of water and adding to it the finely powdered resin, caustic soda, and soft soap. The mixture

should then be boiled for two or three hours. It should be frequently stirred and small quantities of hot water added from time to time until there is 20 gallons of the mixture. Hot water is used in diluting the mixture, 1 gallon of the mixture being used to 4 gallons of hot water.

Resin wash has its maximum efficiency as a spray when the young scales are hatching out. It should not be used when the trees are suffering from the effects of a dry spell.

Like kerosene emulsion, resin wash is now less used than formerly, and it has largely been supplanted by other sprays and by cyaniding.

### Miscible Oils.

Miscible oils are mineral oils that have been treated in such a manner that they will mix quite freely with water. They have been extensively used during recent years as sprays for the control of scale insects.

Quite a number of proprietary brands of miscible oils are on the market and, as a rule, full instructions as to the mode of mixing and application are issued by the manufacturers. It is essential that these oils should emulsify properly, and that they should not be used at too great a strength, otherwise injury may result to the treated plants.

### Nicotine Sulphate.

Nicotine sulphate is a spray that is enjoying a very considerable degree of popularity as a suitable insecticide against aphis, thrips, and other small and delicate insects. It is marketed as a highly concentrated tobacco extract, in which 40 per cent. of nicotine occurs in the form of nicotine sulphate.

This insecticide is generally used at a strength of one part of nicotine sulphate to eight hundred parts of water, a common formula being—

| | |
|---|---|
| Nicotine sulphate, 40 per cent. | .. .. ½ pint |
| Soap .. .. .. .. .. | .. 2 lb. |
| Water .. .. .. .. .. | .. 50 gallons |

The soap is added to produce a better spread and adherence of the spray.

Nicotine sulphate is also often applied as a dust, hydrated lime being in many cases employed as the carrier. The proportions in this dust are generally 5 lb. of the nicotine sulphate to 95 lb. of the hydrated lime. Various proprietary dusts containing nicotine sulphate are now on the market.

### Lime Sulphur.

Lime sulphur is one of the most important sprays used as an insecticide, and it possesses the further merit that it is also a valuable fungicide. It was formerly made on the orchard by boiling a mixture consisting of sulphur, lime, and water. The concentrated lime sulphur solution, however, is now manufactured commercially, and is largely used in place of the home-made article, the preparation of which is a decidedly unpleasant task. Home-made lime sulphur is further referred to in Chapter VI.

The concentrated solution must be diluted before being used as a spray, and in order to determine the exact amount of dilution necessary a Baumé hydrometer is used. This is necessitated by the fact that the strength of the concentrated solution varies quite considerably. The hydrometer is placed in the solution, and the number of degrees registered by it is noted. The reading on the hydrometer indicates the specific gravity of the solution, and by comparison with a table the necessary amount of dilution will be shown.

## Carbon Bisulphide.

Carbon bisulphide is a liquid that evaporates very rapidly on exposure to the air, forming a heavy, highly explosive and inflammable gas. It should, therefore, not be brought into contact with a flame or highly heated pipes, and it is just as well not to smoke when using this fumigant. Although it does not possess the extremely dangerous properties of hydrocyanic acid gas, carbon bisulphide should, nevertheless, be treated with great respect, and the operator should, as far as is practicable to do so, avoid inhaling the vapour. . .

Carbon bisulphide is used principally for the fumigation of stored seeds that may be insect-infested, and it is also frequently employed in the destruction of ants' nests. It is a highly efficient fumigant for the purposes to which it is usually put.

It is generally considered that at least moderate temperatures are required to permit of satisfactory results being obtained in carbon bisulphide fumigation. Less than 60 deg. Fahr. has frequently been productive of very disappointing results, and a temperature of 70 deg. Fahr. or more is desirable.

When carbon bisulphide is used for the fumigation of seed a suitable container must be selected, and care should be taken to ensure that it is quite as airtight as is practicable. The seed to be treated is placed in the container and the fumigant is then added. As the gas produced by the evaporation of the liquid is much heavier than air, it is usual to place the carbon bisulphide in saucers or other vessels on the top of the material to be fumigated, so that the heavy vapour will be diffused through the whole of the enclosed space. As soon as the carbon bisulphide has been placed in the saucers, the container, whether it be a small box or a large iron tank, should be immediately tightly closed.

It has been demonstrated that under average conditions 4 to 5 lb. of carbon bisulphide per 1,000 cubic feet of container will produce satisfactory results in a reasonably airtight container if the insect-infested seeds are exposed to that concentration of fumigant for a period of about thirty-six hours. At the conclusion of the fumigation period the treated seeds or grain should be ventilated or aired.

It is well to remember that this fumigation will kill only the insects that are actually living in the seeds at the time of treatment. To ensure continued freedom from attack the fumigated seed should be subsequently stored in containers that are free from insect infestation, and are so constructed that they can be satisfactorily sealed up.

## Hydrocyanic Acid Gas.

Hydrocyanic acid gas is quite the deadliest chemical in general use as a fumigant in insecticidal work. It has been largely employed in the fumigation of buildings, imported raw materials such as cotton, dormant nursery stock, and last but not least in the treatment of scale insect-infested citrus trees. The following detailed consideration of hydrocyanic acid gas as a fumigant will be confined entirely to its use for the last-mentioned purpose.

The citrus trees to be fumigated are covered by sheets or tents in order to confine the gas for a sufficiently long period to permit of the insects being killed. The sheets used should obviously be made from a reasonably gas-tight material, and for this purpose an 8-oz. special army duck is employed as being most suitable. It is a common practice to dip the new material in a tannin bath in order to minimise the chance of mildew and rotting. The size of sheets or tents employed will, of course, depend on the size of the trees to be treated.

The hydrocyanic acid gas required for the fumigation may be generated in any one of several different ways. Originally potassium cyanide, sulphuric acid, and water were used for its production, but in recent years sodium cyanide has largely replaced potassium cyanide in the pot method of generating the gas. A more recent development in California has been the use of liquid hydrocyanic acid gas. Other developments have been the use of a dust known as calcium cyanide, while a fumigant called Zyklon has also appeared on the market as a source of hydrocyanic acid gas.

The procedure adopted when the pot system of fumigation is employed is briefly as follows:—The tree to be fumigated is covered by a sheet or tent of appropriate size and the number of cubic feet represented by the space enclosed by the sheet is ascertained by reference to a table. This figure on the table indicates in other columns the quantities of sodium cyanide or potassium cyanide, sulphuric acid and water required to produce the correct amount of gas to fumigate such a space. The necessary quantities of these materials are then accurately weighed out or measured, and the requisite amount of water is first poured into an earthenware pot or dish. The measured quantity of sulphuric acid is then added slowly and carefully to the water. Great care must be exercised in adding the sulphuric acid, because if it splashes on the body of the operator it will inflict severe burns. The earthenware pot is placed under the sheet or tent at such a distance from the side of the sheet as to reduce to a minimum the danger of injury thereto by the splashing of the acid. As soon as the earthenware pot is in position the cyanide is dropped into it and a piece of sacking is placed over the pot.

It is essential that the cyanide should be added as soon as possible after the addition of the sulphuric acid to the water in order to obtain the best reaction. As soon as the cyanide has been dropped into the mixture of water and sulphuric acid that portion of the base of the sheet that has been raised to permit of the charging must be closed. It must be clearly understood that the hydrocyanic acid gas is generated very rapidly and is extremely dangerous, and hence the operator should on no account inhale it, and he should withdraw immediately the cyanide has been dropped into the pot containing the mixture of sulphuric acid and water.

In citrus fumigation the time of exposure of each tree to the gas is generally forty-five minutes, which is considered a sufficiently long period to permit of satisfactory results being obtained.

Fumigation with the pot system of cyaniding should be carried out at night, because then the danger of injury to the treated trees is materially reduced. It should never be done during the heat of the day nor in strong windy weather, and it is always well to exercise special precautions in fumigating weak trees. It is further desirable to make sure that the foliage and fruit on the trees to be treated are dry, and it is also generally advisable to avoid fumigating when a heavy dew is experienced. Fumigation of trees bearing an excessively large quantity of tender young growth may be attended with injurious results. A further precaution to be observed in connection with fumigation is that trees that have been sprayed with Bordeaux mixture should not be fumigated with hydrocyanic acid gas for at least six months after spraying.

A great deal of time has been devoted to the study of citrus fumigation in the United States, particularly in the State of California, and investigators in that country have expressed the opinion that fumigation should not be carried out when the temperature rises above 70 deg. Fahr. They also hold the opinion that there is some appreciable danger in fumigating trees carrying small fruit—i.e., at the period between the setting of the fruit and the time at which it reaches an inch in diameter. There is still a field for investigation on many aspects of citrus fumigation in the State of Queensland.

Fumigation, especially for the armoured scales such as red scale, is a very effective means of control. The gas generated penetrates to every part of the tree, and if it is of proper concentration employed under conditions that are both suitable and safe a very high percentage of kill will be obtained. One decided hindrance, however, to the extensive employment of citrus fumigation in Queensland lies in the cost of equipment, which is undeniably heavy if it has to be incurred by each individual orchardist. Where the gas is generated by the pot system, operations have largely to be confined to night work, and a further disadvantage arises from the fact that the sulphuric acid must be handled with great care. On the other hand, if spraying is adopted, the spraying of a heavy foliage tree such as citrus is no easy task, because no matter how painstaking the operator may be it is difficult to reach every portion of the tree.

The remarks on fumigation have so far been confined entirely to the pot system of generating the hydrocyanic acid gas. Attention, however, must now be directed to the recent extensive use in Australia of calcium cyanide dust for citrus fumigation. The procedure in using calcium cyanide is briefly as follows:—Firstly, observations are made to determine whether or not the conditions are favourable for fumigation, then, if the conditions are satisfactory, the trees to be treated are covered with sheets, the trees are measured, and the appropriate doses of calcium cyanide dust are poured out and blown in under the sheets. After the expiry of the necessary fumigation period the sheets are then moved on to the next set of trees to be treated.

The Department of Agriculture and Stock carried out a number of preliminary trials with this dust on citrus trees in several districts,

and in these preliminary trials, under the conditions then prevailing, good kills of red scale and white louse were obtained.

### Where to Obtain Insecticides and Fungicides.

Many orchardists doubtless have their own agents or local dealers through whom they either do or can obtain their supplies of insecticides and fungicides, but, nevertheless, it frequently happens that the Department is asked where these may be obtained. For this reason it has been thought desirable to give the names of some of the dealers in or near the metropolitan area. The Australian Co-operative Fertilisers Limited, Roma street, Brisbane; Buzacott (Queensland) Limited, 371 Adelaide street, Brisbane; Southern Queensland Fruitgrowers' Association Limited, Cleveland; and Taylors and Elliotts Limited, Charlotte street, Brisbane, all handle various lines of insecticides and fungicides.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING FEBRUARY, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Feb. | No. of Years' Records. | Feb., 1929. | Feb., 1928. | | Feb. | No. of Years' Records. | Feb., 1929. | Feb., 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | In. | | In. | In. |
| Atherton ... ... | 9·44 | 27 | 21·07 | 18·11 | Nambour ... ... | 8·48 | 32 | 12·07 | 42·58 |
| Cairns ... ... | 15·24 | 46 | 28·02 | 16·12 | Nanango ... ... | 4·06 | 46 | 4·13 | 10·10 |
| Cardwell ... ... | 17·04 | 56 | 15·24 | 22·36 | Rockhampton ... | 7·06 | 41 | 36·37 | 18·01 |
| Cooktown ... ... | 13·04 | 52 | 26·68 | 23·42 | Woodford ... | 8·15 | 41 | 6·14 | 24·03 |
| Herberton ... ... | 7·36 | 41 | 14·63 | 13·60 | | | | | |
| Ingham ... ... | 16·05 | 36 | 18·48 | 31·45 | *Darling Downs.* | | | | |
| Innisfail ... ... | 22·17 | 47 | 39·52 | 26·25 | | | | | |
| Mossman ... ... | 15·18 | 15 | 31·60 | 36·73 | Dalby ... ... | 2·77 | 58 | 2·80 | 8·47 |
| Townsville ... ... | 11·60 | 57 | 5·25 | 9·66 | Emu Vale ... | 2·24 | 32 | 7·75 | 10·33 |
| | | | | | Jimbour ... ... | 2·65 | 40 | 1·91 | 3·65 |
| *Central Coast.* | | | | | Miles ... ... | 2·68 | 43 | 3·59 | 7·32 |
| | | | | | Stanthorpe ... | 3·17 | 55 | 5·85 | 8·36 |
| Ayr ... ... ... | 9·07 | 41 | 4·15 | 20·64 | Toowoomba ... | 4·22 | 56 | 10·37 | 15·17 |
| Bowen ... ... | 8·87 | 57 | 4·74 | 13·07 | Warwick ... ... | 3·01 | 63 | 6·72 | 8·65 |
| Charters Towers ... | 4·49 | 46 | 4·86 | 5·14 | | | | | |
| Mackay ... ... | 11·31 | 57 | 12·41 | 25·51 | | | | | |
| Proserpine ... ... | 11·61 | 25 | 19·58 | 24·13 | | | | | |
| St. Lawrence ... | 7·67 | 57 | 11·08 | 26·53 | *Maranoa.* | | | | |
| | | | | | Roma ... ... | 3·03 | 54 | 4·68 | 4·09 |
| *South Coast.* | | | | | | | | | |
| Biggenden ... .. | 3·71 | 29 | 7·72 | 19 88 | | | | | |
| Bundaberg ... ... | 5·96 | 45 | 10·73 | 13·18 | *State Farms, &c.* | | | | |
| Brisbane ... ... | 6·31 | 78 | 6·24 | 16·12 | | | | | |
| Caboolture ... ... | 7·06 | 41 | 6·72 | 23·35 | Bungeworgorai ... | 2·49 | 14 | 3·94 | 1·70 |
| Childers ... ... | 5·75 | 33 | 12·51 | 29·57 | Gatton College ... | 3·05 | 29 | ... | 12·09 |
| Crohamhurst ... | 12·50 | 35 | 6·45 | 38·01 | Gindie ... ... | 2·90 | 29 | 5·98 | 3·28 |
| Esk ... ... ... | 5·14 | 41 | 7·91 | 13·99 | Hermitage ... | 2·20 | 22 | 5·47 | 9·57 |
| Gayndah ... ... | 4·11 | 57 | 8·39 | 12·14 | Kairi ... ... | 9·16 | 14 | ... | 16·61 |
| Gympie ... ... | 6·39 | 58 | 10·78 | 18·20 | Sugar Experiment Station, Mackay | 10·02 | 31 | 12·77 | 28·49 |
| Kilkivan ... ... | 4·80 | 49 | 5·37 | 14·86 | Warren ... ... | 3·76 | 14 | ... | 10·62 |
| Maryborough ... | 6·30 | 56 | 3·21 | 17·37 | | | | | |

21st March, 1929.

GEORGE G. BOND,
Divisional Meteorologist.

# THE DAIRYING INDUSTRY IN QUEENSLAND.

## ITS PROSPECTS IN THE CENTRAL DIVISION.

### ADDRESS BY MR. W. FORGAN SMITH TO MACKAY ROTARIANS.

**Queensland is the only country in the world in which dairying is being carried on successfully and on a large scale within the tropics. There are 52 butter and 73 cheese factories and 22,500 dairying establishments in Queensland, and it is estimated that 90,000 persons, or 10 per cent. of the population of the State, are dependent on dairying for a livelihood.**

**The amount of capital invested in the industry in Queensland alone is, approximately, £35,000,000**—*Mr. Forgan Smith.*

**"The dairying industry is a distinct advantage to Queensland. It affords an opportunity for settlement that is not available in other directions, and I believe its capacity for extension, not only in this State, but throughout the Commonwealth, is great indeed."**

These words were used by Mr. Forgan Smith, Deputy Premier and Minister for Agriculture and Stock, to emphasise the importance of dairying, in an address to Rotarians at Mackay on 12th March. The dairying industry, he said, appeared to be a good business proposition for the Mackay district. It was of extreme importance and growing rapidly, every two out of three farmers in Queensland being engaged in it. This was the only country in the world where it was being carried on in the tropical area, which meant they had more problems to deal with than those countries engaged in the industry in the more temperate zones. There were 52 butter and 73 cheese factories, and 22,500 dairying establishments in Queensland, and it was estimated that 90,000 persons, or 10 per cent. of the population of the State, were dependent on it for a livelihood. The amount of capital invested in the industry in Queensland alone was approximately £35,000,000. Last year had been the biggest year in production since the industry was established here, and the Commonwealth statistician made the following statement in the Year Book so far as it was concerned. **"The marked development of dairying in Queensland, where the butter production nearly doubled since 1913, was responsible for the largest share of the increased output in Australia, whilst Victoria and New South Wales also made important contributions to the general progress."** The value of the industry in this State in 1914 was £2,393,402, and in 1927 it had increased to £7,250,000. That increase was represented in butter, cheese, and other dairy products.

#### Cream more Valuable than Gold.

It was also worthy of note that the value of the dairying industry in the Gympie district was far greater than had been the value of gold in the mining days. The quality of the product had also been improved, as a result of the Commonwealth and State Governments acting in conjunction, the idea being to place upon the markets of the world an article equal to that of any other country. **In Queensland there had been distinct progress in this particular direction during the last few years, and since he had been Minister for Agriculture and Stock—a little over four years—eight entirely new butter factories had been opened, and additions had been made to quite a number of other factories.** During his visit to New Zealand, which was an important dairying country, he had been given the opportunity of visiting some of the factories, and he found they were not ahead of the best equipped factories in Queensland. On the stock side, of course, the yield per cow was higher than in Queensland, due to some extent to better breeding and better feeding, as a more uniform rainfall enabled a more uniformly balanced ration to be supplied. In 1925-26 the Queensland percentage of first-grade butter and cheese was 68.3 of the total output, but in 1927-28 it had increased to 82.1. The higher grade butter represented a distinct advantage to the dairyman. as it provided him with a bigger cream cheque.

**Science in the Dairy.**

A considerable amount of work yet remained to be done in connection with scientific research. The production of butter and cheese in a tropical climate presented many problems that were not met with in countries such as New Zealand and Denmark, which were two big competitors on overseas markets. The figures he had indicated in regard to quality went to show that they were working along the right lines, and the technologists in charge of the industry were doing good work; progress would be so continued as the years went by.

**Improvement in Production.**

An important thing with regard to the future of dairying in Queensland was to continue not only the improvement of the factory side of the industry, to which those engaged in it were fully alive, but also to carry out improvements on the production side. **No matter how well equipped a factory might be, unless they kept the cream delivery in a first-class condition it was impossible to turn out a high quality product. In that connection the Agricultural Department was doing a great deal in instructional work, with a view to stressing on dairymen the importance of good breeding and feeding.** When one looked at the average return of butter-fat per cow in Queensland, it was not too much to expect that with proper breeding and feeding it could be increased from 150 lb. to 250 lb. a year. Proof of his statement could be established from the returns of those herds which were subject to departmental grade tests. The department tested herds free of cost with a view to ascertaining for the dairymen the cows which paid, and those which did not. Of those herds subjected to tests, some ranked as high as the average highest yield in other countries of the world.

**The Better Bull Scheme.**

With a view to encouraging the breeding of good herds the Government advances a subsidy of half the cost of a purebred bull to a dairyman with twenty head of dairy cattle or more. Arrangements had also been made with the shipping companies and the Commonwealth Government to give further inducements for the importation of stock from other countries. In Argentine the herds had been improved by the introduction of bulls from Great Britain, and that country would later be a competitor on overseas markets. The future depended not only on the valume of production, but on its excellence, which, when thoroughly established, would provide a good living in dairying.

**The Industry in the Mackay District.**

Continuing, Mr. Smith said he had followed with considerable interest the discussions that had taken place from time to time regarding the establishment of the industry in Mackay. Before starting a factory it was necessary to have an assured cream supply to commence with, as the security for any loan that might be required was not the building and equipment of the factory, but a continuous supply of cream to keep it going at its minimum capacity. There could be no doubt about the advantage of the industry being established here provided they proceeded along sound lines, and dairymen with experience in other parts of the State and Commonwealth would be a big advantage. There were lands in the district suitable for dairying, some of which were privately owned, and some of which was Crown land. It was proposed to open those areas for settlement. There was a considerable amount of land in the Bolingbroke resumption, behind Sarina, suitable for dairying as well as agriculture, and he intended to have an agricultural survey made of it when the weather was more favourable, to establish what those lands were suited for. From investigations made by his officers, some of the land there was suitable for dairying, and some for tobacco and banana-growing, both of which industries would be of advantage in the developmental work of Mackay.

**The Call for Co-operation.**

With regard to the proposed amalgamation, said Mr. Smith, one could readily recognise that to belong to an established organisation was a distinct advantage, as these were days when the best success was achieved in any industry by co-operation. One had to realise that no matter how good a business man might be, if he endeavoured to establish a new business there were certain losses inseparable from the initial stages. To have the experience gained by an established body was an obvious advantage. The control of the technical side of a factory was of extreme importance, and technicians

could be employed by large organisations that a small organisation could not afford to employ. He had noticed that Mr. Wilson had been here to discuss the matter of amalgamation, and the company he represented manufactured a large quantity of high-grade butter. It was not part of his duty as Minister for Agriculture to recommend an amalgamation of companies, as that was a matter the shareholders themselves would have to decide, but he would like to point out the advantages of belonging to an organisation that was in existence.

The Department of Agriculture advanced two-thirds of the cost of building a co-operative butter factory, provided the proposition was a sound one, and having regard to the principles he had previously mentioned. There should be no difficulty in finding portion of the money from that source.

### The Industry yet in its Infancy.

A good deal remained to be done in connection with research in the dairying industry, and it had been proposed that a laboratory should be established by the Commonwealth Government to be worked under the auspices of the Bureau of Science and Industry. Certain preliminary investigations had been made, but one of the difficuties met with was to obtain the services of a man with the necessary qualifications, and so far very little had been done in connection with it. If the Commonwealth did not soon do something, it would be necessary for the State of Queensland to take action on its own behalf, and he proposed calling a conference in June or July of leaders of the industry and technicians to deal with the matter. **Speaking at Murgon on the previous Saturday Mr. T. Flood Plunkett stated that the dairying industry in Queensland was only in its infancy, and in the next few years its expansion was bound to be greater than ever it had been.**

A vote of thanks was accorded Mr. Smith for his address, at the instigation of the President (Mr. A. M. M. Calletly).

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## FLAVOUR DEFECTS IN MILK.

C. McGRATH, Supervisor of Dairying.

Flavour is so important that every attention should be given to aroma in dairy products. A high-grade food product must be free from "off flavours" and odours. Milk is subject to undesirable flavours and odours which if not eliminated detracts from its favourable appeal to the appetite fo consumers, who assume that an "off flavoured" product is intrinsically bad. The products of "off flavoured" milk are usually wanting in the first essential in high-grade food products, that is, an appealing flavour and odour.

The causes of "off flavour" and odour defects in milk have been classified by research workers under these four headings:—(1) Abnormal physical condition of the cow; (2) absorption of odours at the time of milking and after; (3) odours arising from highly-flavoured feed consumed by the cow; and (4) flavours and odours due to biological changes in milk.

### 1. The Health of the Animal.

Milk secretion is a physiological function and is highly complex in its nature. Variation in the composition of milk is liable therefore to happen should the cow's system be not normal. An abnormal condition of an animal's health disturbs the chemical, physical, and physiological properties of milk, and detrimentally affects the flavour, the food, and market value of the milk and its products.

This is an important matter and calls for the special attention of the dairyman. Close contact with the dairy herd enables him to detect unhealthy animals, and the remedy is culling affected cows from the herd.

### 2. Flavours and Odours.

"Off flavours" and odours are absorbed during the process of milking, and subsequently, and include odours from tainted air arising from dirty sheds, yards, and unsanitary surroundings generally; also from fumes and oil odours where milking plants are in use.

All milking plants should be so located and erected as to protect the milk and its products from contamination.

### 3. Food Flavours.

The absorption of air-borne food odours such as silage and green lucerne has little influence on the flavour of the milk, while green maize, oats, wheat, barley, and hay could be fed during milking without imparting undesirable flavours and odours to the milk.

"Off flavours" and odours are imparted to milk through feeding highly-flavoured feeds, also from rank pasturage. From the results of research workers it is known that for the most part the food taint comes through the body of the cow, and not through absorption of taint from the surrounding air.

The food flavours and odours are transmitted through the stomach and lung walls direct to the blood, then through the mammary glands to the milk. In investigating the garlic flavour in milk it was found that its transmission was a matter of minutes only.

Green lucerne, silage, turnips, and rape, when fed to dairy cows, will give rise to undesirable flavours and odours in the milk.

Some foods, even when fed in large quantities, do not impart an objectionable flavour to milk and these include native grasses and many varieties of introduced grasses, also green maize, wheat, oats, barley, &c., well-cured hay, and many of the concentrates.

Investigation has proved that milk drawn from a cow within one hour after having eaten high-flavoured foods will carry a strong flavour of the food consumed. If longer than one hour elapses from the time the cows have eaten certain strong-flavoured food until they are milked the product is comparatively free from the "off flavour" and odour. Such foods should be fed to cows in profit one hour or upwards before milking time.

Many varieties of weeds (herbage) which thrive on cultivated areas and on scrub soils are among the worst offenders in imparting undesirable and, in some instances, intensely disagreeable flavours and odours, to milk, which are carried into the products manufactured therefrom, and depreciate their market value.

From careful investigations it has been found that a number of food taints are perceptible in milk produced three hours and upwards subsequent to the animal eating such foods.

Garlic flavour, for instance, is very pronounced and objectionable in milk. If a milch cow inhales the odour of garlic, its milk will absorb the garlic taint which will remain perceptible in the milk drawn up to seven hours after. When some foods possessing pronounced undesirable flavours and odours are consumed by cows in profit their milk has a pronounced "off flavour" and odour which is most difficult to remove by modern methods of pasteurisation and deodorisation.

Rank pasturage when grazed on, also produces a milk possessing an undesirable flavour.

### 4. Biological Changes in Milk.

The activity of micro-organisms bring about changes in milk and its product which give rise to a variety of flavours and odours some of which are desirable and others injurious and objectionable.

The means by which bacteria gain access to milk may be grouped thusly:—

(1) Intra mammary.

(2) Introduction in the course of milking operations.

(3) Milk utensils.

(4) Milking plants, coolers, and pasteurisers.

(5) Contamination by dust, dirt, and maturing micro-organisms.

(6) Contamination by absorption of impure air and surroundings.

The essential conditions for bacteria control in milk are healthy stock, sound nutritious fodder, the observance of sanitary principles pertaining to the production and handling of the milk and control of temperatures.

# LOSS OF BUTTER FAT IN SEPARATING.

By F. J. WATSON, Dairy Instructor.

From results of tests of separated milk received from dairymen in different districts the fact is evident that loss of butter fat in separating causes very considerable monetary loss to many producers of cream.

Apart from losses through separators being out of order, or through wear and tear, one particular cause of loss of fat is very frequently met with, even when separators are otherwise in perfect condition. In many instances where hand-driven or small belt-driven separators are used the original cistern is discarded and a larger cistern or vat is substituted and fitted to a stand separate to the frame of the separator. It is frequently the case that this vat is fitted with a tap of different proportions to that on the original cistern, and when in operation this tap is usually in a position entirely different from that on the original container, thereby causing faulty separation. It may be observed that the tap of the cistern supplied by the makers of the separator is so fitted that when opened wide to admit milk into the separator bowl it permits the float to rise only to a certain height, and the float, in turn, prevents the milk from rising beyond a certain height in the funnel. The height at which the milk should be kept in the funnel is, in some makes of separator, marked on the inside of the funnel. When a substitute vat is used it is necessary that the height of the vat stand should be so adjusted that when the tap is wide open the milk will not rise in the funnel any higher than it would if the original vat were in use.

## Using a Separator—Important Points.

In using the separator the following points are of importance:—

The separator should be run at the speed indicated by the maker throughout the time of separation. The separator bowl should not be over-fed by admitting milk into it too fast, as will be done when the tap and float are in the wrong positions as described.

Regulation of the milk flow should not be done by hand.

The correct speed of the bowl and the flow of milk should first be assured and then, and not before, should the cream screw be adjusted to obtain the desired percentage of fat in the cream.

The temperature of the milk is an important factor. If the milk is cold, separation is likely to be incomplete. The temperature should be about 90 deg. Fahr., and the separation should preferably be done while the milk is still warm immediately after milking.

It should be remembered that the separator has been made and adjusted by its maker to cleanly separate a certain quantity of milk at a certain speed and in a certain time, and that any variation in speed, feed, time or adjustment will result in faulty separation.

If the separator is run only a few turns per minute below its proper speed, or if it is fed with only a few gallons per hour beyond its intended capacity, there will be a loss of fat with which the adjustment of the cream screw has nothing to do.

The following table, compiled from actual experiments, shows loss of fat that may occur when the separator is not run at proper speed.

| Cream. | Loss when Separator was Run at Correct Speed. | Loss when Separator was Run 10 to 15 Turns Too Slow. |
|---|---|---|
| Per cent. | Per cent. Fat. | Per Cent. Fat. |
| 30 | 0·020 | 0·08 |
| 32 | 0·025 | 0·085 |
| 35 | 0·030 | 0·095 |
| 36 | 0·020 | 0·110 |
| 38 | 0·030 | 0·140 |

Running the separator over speed does not give any appreciable advantage in separating.

## QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Pigeon-Berry Ash or Southern Maple is a large tree of the rain forests of the ranges of Southern Queensland and Northern New South Wales. In botanical nomenclature it is known as *Cryptocarya erythroxylon*. The trees have no prominent buttresses. The bark is pale and somewhat scaly; when cut it has a peculiar fragrance. The wood is also slightly aromatic, and is slightly pink when freshly cut. In appearance the wood is somewhat like Queensland maple, but is scarcely so ornamental. Nevertheless, the wood is a useful one for cabinet work and indoor building purposes.

*Photo.: W. D. Francis.*]

PLATE 85.—PIGEON-BERRY ASH (*Cryptocarya erythroxylon*).

A tree in the ranges to the east of Killarney.

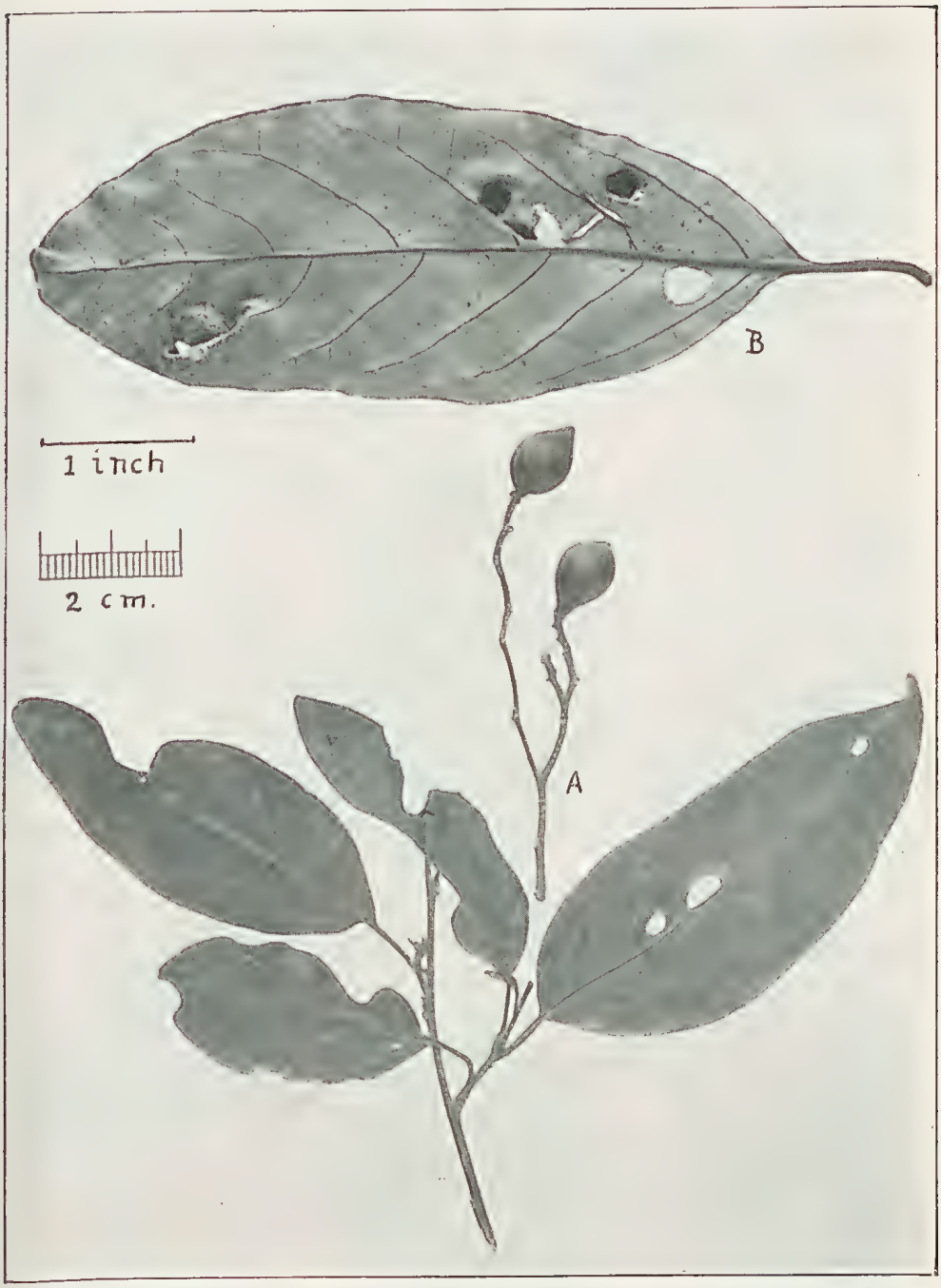


*Photo.: Department of Agriculture and Stock.*]

PLATE 86.—PIGEON-BERRY ASH (*Cryptocarya erythroxylon*).

A, Dry Fruits; B, Leaf showing underside.

# WEEDS OF QUEENSLAND.

## THE CORRECT BOTANICAL IDENTITY OF THE LANTANAS NATURALISED IN QUEENSLAND.

By C. T. WHITE, Government Botanist.

As a good deal of work is being done in Australia at the present time by veterinarians regarding the effects of Lantana on stock, the present notice is given defining those Lantanas naturalised in Queensland. As is well known, Lantana causes a disease in cattle known colloquially as "pink-nose."

In published reports of feeding tests with Lantana the species have been confused, for, unfortunately, the material experimented with not having been submitted to a botanist for correct determination.

The first record of the disease is by Tucker in the Annual Report, Department of Agriculture and Stock, Brisbane, 1910-11, p. 25. A further report was made by Pound in the Annual Report, Department of Agriculture and Stock, Brisbane, 1913-14, p. 109. There is undoubtedly confusion here, the red flowering Lantana referred to being the variety *Sanguinea*, and the pink flowering Lantana being the common *L. Camara*, not *L. Sellowiana*.

From the records so far published it would seem that both species are harmful, but the red flowering variety (*L. Camara*, var. *Sanguinea*) is by far the more virulent.

Lantanas are common in garden culture in warm temperate countries, and several forms of the common Lantana are recognised. Two red flowering varieties have been described—viz., var. *crocea* (*L. crocea* Jacq.) and var. *sanguinea* (*L. sanguinea* Medikus). These are very close, but I think the one naturalised in Queensland comes under var. *sanguinea* rather than the var. *crocea*, to which it has previously been referred.

### 1. *Lantana Camara* (Common Lantana).

*Botanical Description.*—A rambling shrub, stems 4-angled, the angles bearing short, somewhat recurved prickles. Leaves opposite, bright green above, paler beneath, averaging 2½ in. long and 1½ in. wide, but variable as to size, on short stalks about ⅓ in., subcordate, rather pointed at the apex, scabrid (rough to the touch) above, the veins and veinlets clothed with white, rather soft hairs beneath, margins serrate-crenate. Flowers in heads of about 3 flowers, about 1 in. across, on stalks about as long as the leaves, opening pale cream with a dark yellow centre, dying off lilac or purplish. Fruit fleshy, purplish black when ripe, ovoid, about ⅓ in. long, borne on the floral receptacle which becomes elongated, thickened and somewhat fleshy.

*Distribution.*—A native of tropical America, now widely distributed as a weed over the tropical and subtropical portions of the world.

*Botanical Name.*—Lantana, an ancient name of the Viburnum, which this resembles a little in foliage (Loudon); Camara, an old generic name of the Lantana.

*Botanical Reference.*—*Lantana Camara* L., sp. pl. 874.

### 2. *Lantana Camara* var. *sanguinea*.

*Botanical Description.*—Differs from the type in the flowers opening yellow and turning bright red.

*Distribution.*—A native of the West Indies, but now, like the normal form, widely distributed over the tropics and subtropics of the world. The variety is not so abundant as the type in Queensland, but is fairly widely distributed, and in some places is the dominating form.

*Botanical Name.*—Genus and species as above; varietal name *crocea*, Latin, meaning saffron-coloured.

*Botanical Reference.*—*Lantana Camara* L., var. *sanguinea*, L. H. Bailey (*L. sanguinea* Medikus in Act. Acad. Theod. III. Phys. 229).

### 3. *Lantana Sellowiana* (Small or Creeping Lantana).

*Botanical Description.*— A shrub, climbing in the absence of support, trailing along the ground, or weeping over rocks, &c.; branches slender, quadrangular in the young state, but soon becoming more or less rounded; unarmed. Leaves bright green above, paler beneath, rather small, averaging 1 to 1½ in. long and about ¾ in. broad, but variable as regards size, on a stalk of about ¼ in., margins serrate-crenate, soft to the touch, covered above and below (particularly on the veins below) with scattered white hairs. Flowers in heads of about 20 flowers and about 1 in. across,

PLATE 87.

Left.—Common Lantana (*Lantana Camara*). Right.—Small or Creeping Lantana (*Lantana Sellowiana*).

in the leaf axils on slender stalks about twice as long as the leaves, mauve or light purple with a yellow throat, becoming darker and losing the yellow throat with age; outer bracts (subtending the flowers) broadly ovate forming a sort of involucre, inner ones successively narrower. Fruit a small reddish-brown drupe (''berry''), borne on the enlarged receptacle, bracts persistent.

*Distribution.*—A native of South America widely cultivated in tropical and sub-tropical countries as an ornamental trailer.

*Common Names.*—Small Lantana, Trailing or Weeping Lantana, Wild Verbena are names applied to it in Queensland.

*Botanical Name.*—*Lantana* (see under *L. Camara*); *Sellowiana* in honour of Friedrich Sellow, a German botanist who travelled extensively in South America during the early part of the nineteenth century.

*Botanical Reference.*—*Lantana Sellowiana* Link and Otto, pl. sel. hort. Berol., p. 107, t. 50.

## QUEENSLAND SHOW DATES, 1929.

The following is the official list of Queensland Show Dates for 1929, as issued by the Queensland Chamber of Agricultural Societies:—

Miles: 3rd April.
Pittsworth: 4th April.
Chinchilla: 10th and 11th April.
Clifton: 10th and 11th April.
Toowoomba: 15th to 18th April.
Dalby: 22nd to 24th April.
Goondiwindi: 23rd and 24th April.
Nanango: 23rd and 24th April.
Kalbar: 27th April.
Allora: 30th April and 1st May.
Charleville: 1st and 2nd May.
Taroom: 6th and 7th May.
Kingaroy: 2nd to 4th May.
Beaudesert: 1st to 4th May.
Mitchell: 8th and 9th May.
Boonah: 8th and 9th May.
Wondai: 9th to 11th May.
Mundubbera: 8th and 9th May.
Blackall: 7th to 9th May.
Ipswich: 14th to 18th May.
Roma: 14th and 15th May.
Springsure: 15th and 16th May.
Murgon: 16th to 18th May.
Gayndah: 15th and 16th May.
Goomeri: 21st and 22nd May.
Wallumbilla: 21st and 22nd May.
Biggenden: 23rd and 24th May.
Emerald: 23rd and 24th May.
Toogoolawah: 24th and 25th May.
Maryborough: 28th to 30th May.
Marburg: 3rd June.
Childers: 4th and 5th June.
Lowood: 7th and 8th June.
Gin Gin: 6th to 8th June.
Bundaberg: 13th to 15th June.
Bororen: 17th and 18th June.
Gatton: 19th and 20th June.
Gladstone: 19th and 20th June.
Mount Larcom: 21st and 22nd June.
Rockhampton: 26th to 29th June.
Esk: 28th and 29th June.
Kilcoy: 4th and 5th July.
Townsville: 9th to 11th July.
Home Hill: 12th and 13th July.
Samford: 12th and 13th July.
Caboolture: 18th and 19th July.
Rosewood: 19th and 20th July.
Laidley: 24th and 25th July.
Nambour: 24th and 25th July.
Maleny: 31st July and 1st August.
Bowen: 31st July and 1st August.
Maleny: 31st July and 1st August.
Nundah: 3rd August.
Royal National: 12th to 17th August.
Goombungee: 30th August.
Malanda: 18th to 19th September.
Beenleigh: 27th and 28th September.

## CARE OF CHURN AND WORKER.

The importance of keeping the combined churn and worker in a satisfactory condition must not be overlooked. As the period of service increases extra care is required in order to keep the wood surface that comes in contact with the cream and butter in a clean and sanitary condition.

The liming of the churn once a week will be found beneficial. This operation is carried out by placing in the churn, which has previously been thoroughly cleansed and scalded, approximately 50 gallons of warm water (120 deg. Fahr.), to which is added about 10 lb. of slacked lime. The churn is then revolved for ten to fifteen minutes at intervals of one hour. The lime solution should be held in the churn overnight, the churn being made airtight to prevent the lime from drying out on the wood surface. The following morning revolve the churn for five or ten minutes, run off the lime solution, and thoroughly rinse the churn with clean cold water to remove all particles of grit or foreign matter.

Before use the churn should be scalded and cooled in the usual way.

# HINTS FOR TRACTOR OWNERS.

## THE "FIERCE" CLUTCH AND THE LEATHER-FACED CONTACT SURFACE.

By E. T. BROWN.*

The clutch mechanism calls for very little attention apart from keeping it lubricated. It is necessary, however, to adjust it from time to time, but this is a simple matter, and only takes a few minutes. As a general rule, the spring that forces the contacting surfaces together can be regulated, and in this way any slight alteration that is needed can be brought about. When one of the contacting surfaces is leather-faced, as is frequently the case, it may be necessary to dress the leather with some suitable oil to make it "bite" more firmly. When this is necessary the fact is known since the clutch is fierce—that is, it fails to slip slightly when the clutch is being engaged. A fierce clutch causes the engine and transmission mechanism to engage too suddenly, with the result that a severe strain is imposed on the parts concerned. If this fierceness be noticed, the clutch should be disengaged and held in that position by means of blocks of wood, or any other material suitable for the purpose, while the leather is being dressed. The leather should be thoroughly cleaned—with petrol if oil-smeared—and then dressed with colan oil. It is sometimes suggested that castor oil should be employed for this purpose, but although it may be used when colan oil is not available it is not nearly so good. The oil should be allowed a few hours, with the clutch disengaged, to soak well into the leather.

### The Driving Chains.

The driving chains, when these are employed as part of the transmission system, play a very important part in the efficiency of the outfit. For this reason they should be looked after in a proper manner. It is not enough to oil them occasionally. Owing to the nature of the work done they very quickly become clogged with dirt of one kind and another. The need for attention to this part of the outfit does not only arise from the question of damage to the parts concerned, but unless the chains work freely more power is absorbed for propelling the machine and less is available at the draw-bar. If the chains be kept clean and well greased there will not be much chance of the dirt penetrating the working parts of the rollers, but even that on the outside will make the whole work less easily. All mud should be scraped off every time the tractor is used and a liberal supply of grease should be applied. Before running the machine again oil should be added to the grease so that the two together will permeate the bearings. Occasionally it is a wise plan to take off the chains, brush them with kerosene, and soak them afterwards in melted tallow. In addition to keeping the chains clean and lubricated it is essential to see that they are adjusted correctly. The best results are obtained when there is a certain degree of play. The upper part of each chain, between the two sprocket wheels, should give 2 to 2½ in. when forced upwards. This, generally speaking, is the best setting for the majority of tractors. Adjustment is simple. All that is required is to shorten or lengthen the radius rods by means of their screwed ends. It is important to see that both chains are working with the same degree of play, otherwise a severe strain is put on the transmission.

### Starting up the Engine.

No tractor engine is particularly easy to start-up. But by priming and making use of the impulse-starter or the decompressor, if either be fitted, and knowing how to swing the engine, it becomes more easy. Most tractors are fitted with dual tanks. One—the smaller—contains petrol for starting-up; the other kerosene, the fuel used when the machine is at work. The reason petrol is employed in the first instance is that it is more volatile, and therefore gives a better firing mixture when cold. Before attempting to swing the engine the spark should be retarded. If advanced the engine backfires, and may cause serious injury to the operator. The spark is always timed to occur before the end of the compression stroke when the engine is "revving" normally; if set in the same position when the engine is being rotated slowly by hand it occurs long before the end of the compression stroke. The firing of the mixture thus early naturally results in the piston being forced in a backward direction. Incidentally it may be mentioned that one make of tractor is fitted with a patent device that renders a backfire impossible. To save turning the engine too much by hand the cylinders should always be primed. The compression taps should be opened

*In the "Farmer and Settler."

and a little petrol injected into each cylinder; if no such taps be fitted the sparking plugs must be taken out and the petrol injected through these openings. The engine should then be given two complete turns, so that the fuel vapour in one cylinder is fully compressed and on the point of firing. If the engine be well tuned, with every part properly adjusted, it should start up at this stage with one strong pull up of the starting handle. A little bother beforehand saves a vast amount of swinging—always a laborious job on any except the smallest machines.

## BORDER STOCK RESTRICTIONS.

The relaxation of restrictions on the introduction into New South Wales of stock from Queensland has been the subject of repeated representations made by the Minister for Agriculture and Stock, Queensland (Mr. W. Forgan Smith), to the Minister for Agriculture, New South Wales (Mr. H. V. Thorby).

It has been contended by Queensland stockowners, supported by the Stock Department in this State, that these restrictions are harassing, and in some instances unjustified. It is maintained that there is no necessity for the drastic provisions in New South Wales regulations dealing with the introduction into that State of Queensland stock which have been depastured in areas free of the tick and maintained tick free for years.

As a result of these representations Mr. Forgan Smith has now been officially advised that a proclamation has been issued under the New South Wales Stock Act, which provides that the country between the Western Railway and the Great Dividing Range, from Toowoomba on the east to the Miles-Wandoan Railway on the west, has been included in the area known as Schedule "T."

As a result of the inclusion of this country in Schedule "T," all cattle which have been in the area referred to for the preceding three months prior to removal to New South Wales are now eligible for entry into that State after receiving one dipping under official supervision in an approved dip, and another dipping on arrival at the border within a period of from five to fourteen days. This is a considerable concession, in that from three to four dippings were hitherto required to permit of the introduction of cattle into the adjoining State, and cattle by road from the new portion included in Schedule "T," the area north of the railway, were not eligible for entry into New South Wales until they had been south of the Western Railway for a period of three months.

In addition to the proclamation referred to, a previous proclamation was issued modifying the restrictions on the movement of cattle into New South Wales from that part of Queensland described in their regulations as Schedule "Z" to permit of entry into New South Wales at the border on one dipping, provided the cattle have been in Schedule "Z" or Schedule "W" for a period of three months.

It is understood that the New South Wales authorities have under consideration the removal of the line described as "K" from a point between Tallwood and Miles to a point east of Goondiwindi, and an inspection has been arranged by the New South Wales Stock Department of the area in order to locate a suitable position for the line.

## UNSEEN FRIENDS AND FOES.

What makes milk and cream sour and causes the ripening of cheese? What causes scour in calves, tuberculosis in cattle, and diphtheria in children? The answer is bacteria, which are also called germs and microbes.

These micro-organisms are so small that they cannot be seen with the naked eye, but can be seen and distinguished through a microscope. Large numbers of them can find accommodation on the point of a needle. All are not harmful, and many species of micro-organisms are necessary for furthering the work of man in his varied industrial and scientific activities. Some, however, are harmful, and scientists are constantly seeking means to destroy them. The means used to fight germs are called disinfectants. Fire, heat, boiling water, and live steam are in common use as disinfectants or germ destroyers. The cheapest disinfectant and one that is available on every farm is direct sunlight. Sunlight is an effective germ destroyer, and we should make more use of it. Limewash is a good disinfentant for wood work of sheds and dairy premises. Sunlight and limewash are aids in the maintenance of sanitary conditions on the farm.—C. McGRATH, Supervisor of Dairying.

# THE BUFFALO FLY PEST.

## STATEMENT BY THE PREMIER.

The Premier, Hon. W. McCormack, informed the Press recently that he had read the reply made by the Prime Minister (Mr. Bruce) to the question asked by Mr. Grosvenor Francis relative to the Buffalo Fly pest. The Prime Minister is reported to have said that "the work now being carried out to combat the Buffalo Fly pest is being done by the Council for Scientific and Industrial Research. He did not recollect whether any assistance had been rendered by the Queensland Government, but would investigate the matter."

The Buffalo Fly has been known to exist in the Northern Territory for more than a quarter of a century, and has been a pest to cattle in the northern part of Western Australia for many years. Its presence is known in a part of north-western Queensland as a pest which spread from the Northern Territory, and is affecting the herds of cattle-owners in two of the States of the Commonwealth. The Queensland Government is of opinion that the control of the pest should be treated as a national matter, and advised the Commonwealth Government to this effect.

### Activity of the Queensland Government.

In 1925 the Council for Scientific and Industrial Research arranged with Mr. Murnane, Bachelor of Veterinary Science, to visit the northern parts of Western Australia and the Territory with a view of submitting a report upon the incidence of the Buffalo Fly in those areas. In December, 1926, Mr. Murnane submitted a report upon his findings and, inter alia, stated that the Buffalo Fly was, at that time, within 70 miles of the Queensland border. In January, 1927, the Prime Minister was communicated with and requested that every effort should be made to bring the pest under control within the Territory and obviate the danger of its spreading into Queensland. The Queensland Government offered to co-operate, through its officers, with the Commonwealth Government. It was further suggested that urgent investigations should be carried out by the Commonwealth Authorities with a view of restricting the spread of the fly. The Federal Government failed to take any action that would be efficacious in restricting the spread of the pest, and in March, 1928, the Prime Minister was then advised of its seriousness to the pastoral interests of this State, and a suggestion was made that a buffer area should be declared in that part of the Northern Territory adjoining the north-western boundary of Queensland. This suggestion was not acted upon, nor was any other action taken that was likely to be efficacious in the removing of the danger of the introduction of the fly into Queensland.

### State Departmental Action.

Although the available reports indicated that the fly was some distance from the Queensland border, the State Government did not relish the inactivity of the Federal Authorities in attempting to cope with the position, and in July, 1928, arrangements were made for an officer of the Department of Agriculture and Stock, in the person of Dr. John Legg, D.V. Sc., to make an inspection of the north-western part of Queensland and the border of the Territory and report. Dr. Legg advised that he had not been able to detect the presence of the fly at the time of his visit, but was informed that the stock on portion of a Queensland holding bordering on the Territory were infested with the fly during the wet season. A copy of this report was made available to the Commonwealth Government and in August, 1928, the Prime Minister was advised as to the position and the seriousness of the introduction of the fly into Queensland from the Territory, and the request was again made that a national view should be taken of the possible spread of the Buffalo Fly, and a recommendation was made that certain properties be resumed by the Federal Authorities and an effective buffer area established. To effectively remove the possibility of the fly being carried by travelling stock from the Territory into Queensland through the stock crossing at Wollongorang, this crossing was closed in October, 1928, and the Commonwealth Authorities were notified accordingly.

In order to determine definitely whether or not the pest had extended from the Northern Territory to the holdings on the Queensland border, arrangements were made for Messrs. Smith, Entomologist, and Clegg, Stock Inspector, to visit that part of Queensland and report. The report of these officers indicated that the Buffalo Fly was present on stock on these holdings. A copy of the report was made available to the Federal Authorities and the Council for Scientific and Industrial Research. Upon the discovery of the fly on the holdings referred to these areas were placed under quarantine and incidentally the movement of stock from such holdings prevented.

**Queensland Authorities Fully Alive.**

From the foregoing it will be noted that the Federal Government has been fully apprised of the position from time to time. A definite proposal was made to that Government in January, 1927, and in subsequent communications this proposal was reiterated, but to date this Government has not received any definite advice as to whether or not the Federal Authorities are prepared to treat this matter as one of national importance nor have they suggested any alternative to the proposals made by this Government.

The Department of Agriculture and Stock, through its officers, has been closely co-operating with the Council for Scientific and Industrial Research, and a clear understanding has been arranged with that body as to the manner in which the entomological investigations are to be carried out. The matter of bringing this pest under biological control has suggested itself and it is in this sphere that the science workers, associated with the Council, at present are engaged. Unfortunately, the position is that if success is achieved along these lines, it will be some considerable time before the spread of the fly will be checked, and in the interim there is the grave possibility that the fly will spread further eastward. This Government informed the Commonwealth Government of its willingness to co-operate in any proposal that may be considered effective in controlling the spread of the fly, but while the Commonwealth Authorities maintain an attitude of "do nothing" it becomes rather a difficult matter to furnish particulars of any good that has been achieved. On the other hand the particulars herein supplied clearly indicate that this Government has done all that has been humanly possible under the circumstances, and in the event of the Commonwealth Government advising that they are not prepared to deal with this matter as it should rightly be dealt with—that is, on a national basis—this Government will take such further action as may be necessary to keep the fly within restricted limitations.

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## THE CULT OF THE COLT.

By "U 9 L."*

VIII.

### TAMING THE OUTLAW.

The colt we tackle this time is a sour brute of a thing, one with no more breeding than a Hun, and verily its ideals of honour and sportsmanship are unspeakable. All our blandishments are contemptuously hit to leg, as it were, and try as we will we can't get in touch with the thing at all. By that latter I mean in a mental sense. Physically we can put out hands on it, but mentally and morally we're outside the yard. I'm not going to weary you with the tedium of handling a colt of this sort—there's enough real trouble in the world without looking for it on a sheet of paper—and just in the process of running through there may be an odd point which is worth consideration.

We throw the ropes on the colt. Immediately in a squealing fit of rage it bucks round and round the yard, kicking and striking at anything and nothing, and it ends by entangling itself like unto a fly in a spider's web. Now, that's a nice mess, isn't it? The thing has shown by its actions that it's not fit company for a white man, and yet we have to untangle it. It's hazardous work; but it's got to be done. There's one point we've overlooked, though. With that last flying lash of its hind feet the colt nicked a bit of vein on it's other hind leg, and from that cut the blood is squirting. There's no danger of him bleeding to death—such rubbish as this doesn't ever meet an untimely end—and we've got to staunch that flow after we have the ropes off.

The trouble, though, is to get them off. It's no trouble at all! As sure as ever a snorter pricks its own bubble by letting a bit of blood from itself, that cools its fiery temper and quells its unruly spirit. In its own imagination perhaps it thinks

* In the "Pastoral Review for December, 1928. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928, January, February, and March (1929) "Journals" from the February, April, May, July, September, and October (1928) numbers of the "Pastoral Review."

itself bleeding to death, and its feeble ounce of pluck is gone. When a thing of that sort has bled a bit—not more than about an egg cup—it's as tame as Mary's little lamb. It hasn't the guts to resist, it hasn't the desire to fight, and it stands helpless and harmless while you do with it what you wish. There may be exceptions to this; but I've never met 'em, and I've had it happen with more than a few. In fact, let me whisper, on real bad 'uns I've taken an ounce of blood on purpose and found it act as I desired every time. Mind you, I don't say it was good for the colt. But the sort of thing to which I refer had no good in it, so it didn't matter anyway.

If the blood is flowing freely and won't stop when you reckon it should, the easiest, if not the best way to stop it is with a pin and horsehair. Pin the lips of the wound together—just slip the pin through any old way and don't worry about making a neat job of it. Then get a long hair from the horse's tail and wind that figure of 8 backwards and forwards over and round the points of the pin. In next to no time at all the blood will clot on that hair and caulk the wound, stopping the bleeding.

Now, before going further, let me have a word or two to say about temper. Temper, like charity, covers a multitude of sins, and there are tempers and tempers. For the surly, stubborn, broody, and sluggish tempered horse I wouldn't give you threepence a dozen or accept them as discount thrown in on a pound of tea. And for the thing without any temper at all I wouldn't return anything but curses. You know the latter type of horse. It's the sort which is always falling over itself in an effort to please you, which never does anything wrong when you're looking, and which is an abomination on the face of the earth.

### The Colt with a Bit o' Devil.

But when a man gets a colt with whips of devil, with a snap and sparkle in its moods, then he's got something for which he should return thanks. Above everything else give me a horse that's a contrary little cuss, that fights clean and wholesome, and one with individuality and a spirit and soul of its own. Give me something that's so darned contrary it won't admit it's beat, and when the dry sweat's caking its body, and when its breath comes in choking sobs, when it's so weary it can't lift its feet clean from the ground, then will that contrariness and devil rise superior to circumstances and its spirit will see you in blazes before it'll admit it's beat. Yes, give me devil without spitefulness, snap and sparkle without sullenness, and fight without vice and I'll show you what a horse is and what it can do.

Unfortunately, we're not handling a thing of that sort now. This that we've got is a negative proposition. Kicks! Why, my dear old sir, the thing kicks just for the fun of it. Can we cure it? I'm afraid not. Some people advocate hanging a bag of earth in a stable and letting the horse kick to its heart's content. Every time that horse kicks the bag it comes back and knocks him harder. The horse may get tired; the bag keeps coming all the time. In theory that may be right. In practice it's a blank. It's only teaching a horse to kick. Try it if you wish; but don't blame me if you get hurt.

### Curing Kicking with Confidence.

The only thing which will stop kicking is confidence. Kicking, nine times out of ten, is prompted by fear and is used as a means of protection. You've got to overcome that fear, and in overcoming it you've got to show the horse that you're not afraid. Mind you, this is a fool's game, but it can be done, and there are lots of fools in the world. Move about the horse, walk behind him, lay yourself open to a knock or two, and keep your eyes peeled and your legs under you that you don't get it. If by any chance you happen to be standing in the corner of a yard or stall and a horse, any horse, swings round on you and brushes your face with the butt of his tail, that's the time your heart skips a beat or two and jumps to your mouth. There's only one thing to do; stand perfectly and absolutely still. It takes doing, let me tell you, but it's best done unless you're as slippy as greased lightning in your actions. Usually the horse doesn't know you're there. If you move you frighten him. If he's frightened he takes the only means he knows to protect himself from behind. Keep still, pray if you wish, and look for a chance to slip out of harm's way as easily and as soon as possible. Another way you may nullify a kick is by dropping your hand on the hamstring—the Achilles tendon, to air the only bit of anatomical knowledge I possess. That has a paralysing effect on that hind leg.

### The Striking Habit.

When we go to slip the halter over the ears of the thing we're handling now it shows touchy about the ears, swings its head away in a wild sweep, and perhaps both fore feet whizz through the air and smack the ground beside us. Such things do happen, you know. Mobs and mobs of horses are touchy about the ears. More often than not that touchiness is expressed when the bridle is being taken off, and they submit without trouble to the thing going on. In fact, with some of 'em, it's a dickens of a job to get that bridle off their ears.

There's no cure for this—none that I've found, anyway. It's merely a case of custom, over and over again, and soothing words all the time. I've seen them so bad that they had to be roped to a post, or one front leg tied up, before the bridle could be taken off them. But with care they come to it in time. They'll always be a bit ticklish about the ears; but so long as a man doesn't infringe too greatly they aren't more than a little bit of a nuisance. That striking habit is something the same as kicking—it has to be overcome by moral suasion. It's no use taking a stick to a thing of that sort when the horse is young. In very rare cases, in later years, a stick may have a beneficial effect. And, again, it may only provoke an added outburst. Moral suasion's a winner every time when handling colts. Its effect bites deeper and the results are more lasting.

After an infinity of trouble we teach this slug which we have in hand all the other rules of the curriculum, and now we try and induce it to lead. Needless to say, and as we expected, it won't! It takes a couple of steps stubbornly, its head held forward and its tail jammed, and all the soft words and lollied blandishments we toss the thing don't penetrate skin deep.

### When it is You or the Colt for it.

We try again. This time it comes with a run—it comes on its hind legs, with its mouth open, and with sudden death attached to the pedal extremities of its two fore legs! Now you're up against it, sir. This is distinctly a breach of good manners that can't be tolerated in any decent school. You've nothing in your hand but a bit of a harmless strap that wouldn't inconvenience a mosquito; you've got a raging devil in front of you, and I can tell you from the bottom of my heart that at no other time during this journey through life does a man feel so altogether helpless and alone. You've nothing in the yard with which you may defend yourself, and it's you and the colt for it. Which is going to win?

That depends entirely on the stuff of which you're made. You know there's a bit of a spreader outside the yard—a lovely bit of a stick about 3 ft. long and an inch through, and you'd give sixpence out of your own pocket to have it in your hand. But you daren't leave that yard till you've asserted yourself and proved to that dumb brute beast of the field before you that you're a better man than he is. You're up against it, and you've got to assert yourself. There's only one thing to do; you've got to go on with what you were doing—the same that induced the charge but a minute ago—and by will power alone must you subdue any insubordination. It takes doing, let me tell you, and though your voice may take a domineering note, your mind is quailing—and I don't blame you.

### Stopping a Charge.

When you've proved to that colt that you're a better man than he is—be the proof ever so little—then go and get the stick. Now your spirit rises in strength, now your voice rings true, and now you tell that colt to do his darnedest. In fact, he has to be made to charge. If he won't do it of his own accord he's got to be goaded into it—he did it once, and he's got to learn it can't be done again. The first time you proved to him that he couldn't frighten you, and the second time it has to be proven that you can frighten him.

He comes! No he doesn't! He started to come; but you used that spreader with judgment. Smash! It got him along the forehead, and that colt stands in the corner of the yard and shakes his sulky head. He's had enough, and you're boss. But if a lesson has to be made drastic it must be driven home with emphasis. Again and again that colt is goaded to charge, and every time it so much as lops its ears or rolls the whites of its eyes it feels the might of man in his power. It's cruel; but it's got to be done.

By the way, a charging horse may often be stopped by hitting it solid with the heel of the palm of the hand on the point of the nostrils. It may not be as efficient as a stick, and it can't be followed up and driven home as with a stick; but I know it stops them more often than not. Why, bless you, I've been stopped myself in that way, so why shouldn't a horse do the same?

# THE COTTON INDUSTRY AND THE TARIFF.

## STATEMENT BY THE MINISTER FOR AGRICULTURE.

The Minister for Agriculture (Mr. W. Forgan Smith) informed the Press recently that he was much concerned about the decision of the Federal Government to defer for some months at least the matter of consideration of the Tariff Board's report upon the cotton industry. The inexcusable procrastination of the Federal Government in relation to the industry was lamentable, and both the growers and the spinners of cotton would be adversely affected as a result of the delay that has occurred.

The specious special pleading indulged in by the Minister for Trade and Customs (Mr. H. S. Gullett), in making the announcement in the Federal Parliament, was a clear indication that in its report the Tariff Board—a body established by the Commonwealth Government itself—favoured the requests of the cotton growers and manufacturers. The decision of the Commonwealth Government also is a direct repudiation of its undertaking that immediately the Tariff Board reported on this question, the necessary action would be taken. Briefly stated, the position is that three years ago the Commonwealth Government embarked on a policy of protecting this industry. On that occasion the Tariff Board took exhaustive evidence and presented a lengthy report of the economic ramifications of the industry and made certain recommendations, some of which were given effect to by the then Government. It has since been found that the action of the Commonwealth has not been adequate to achieve the policy enunciated by the late Mr. H. E. Pratten, who intimated at the time that millions of pounds of capital would be available for the establishment of the cotton manufacturing industry in Australia. "We have to-day the startling anomaly that whilst cotton in unlimited quantities can be produced in Queensland, cotton goods to the equivalent of from £12,000,000 to £15,000,000 sterling are imported annually into the Commonwealth, a very large proportion of which, quite reasonably, could be produced and manufactured here and provide employment for large numbers of Australian citizens," added Mr. Smith.

### Tariff Anomalies.

Continuing, the Minister said that it had been shown beyond question that the weakness in the existing position lay in the inadequacy of the protection against imported cotton yarn. Imported cotton yarn equivalent to 20,000 bales of lint was being imported annually into Australia from Britain, U.S.A., and Japan. It was a lamentable reflection upon the inefficiency of the existing tariff arrangements to realise that during the past financial year close upon 8,000 bales of cotton had to be exported, whilst yarn to the equivalent of 20,000 bales had been imported. A complete case for the correction of these anomalies was submitted by the Cotton Board and the cotton spinners combined to the late Minister for Trade and Customs, and the Tariff Board and Mr. Gullett and his colleagues in the Federal Government have this information at their disposal.

### Cotton Growing needs Protection.

Cotton growing in Australia was a comparatively young industry, and as such requires encouragement and protection at least equal to that given to other industries. A large proportion of the cotton products that are now imported could be produced in the Commonwealth. The soil, climatic and environmental conditions prevailing in many parts of Queensland are suitable for the growing of cotton, and if this industry is fostered to the degree that it is deserving of, an additional primary and secondary industry can be readily established.

Stability is the life blood of any industry and no industry can progress unless it is established on a sound foundation. Both the growers and spinners of cotton have been left suspended in mid-air without any definite knowledge concerning the future prospects of the industry. Under such conditions progress is impossible.

### A Detrimental Delay.

The Federal Government has failed to appreciate the fact that the cotton growers must have a knowledge of the position, and be able to estimate with some degree of accuracy the figure their cotton will realise before the cultivation of the land and planting of the crop is proceeded with. It is necessary also that the cotton spinners should have early intimation as to the area planted under cotton and the prospective tonnage of cotton that will be harvested, so that they can satisfactorily arrange their purchases of ginned cotton. The delay in the announcement of the fiscal policy of the Government in connection with any primary industry is detrimental.

### A Serious Risk to the Industry.

Mr. Gullett (Minister for Trade and Customs) would now have us believe that economic issues which arise out of such a policy have only now been brought under the Commonwealth Government's notice. This is a misrepresentation of fact. The truth is that the original Tariff Board report of three years ago examined those aspects of the matter. With them the late Mr. Pratten and his colleagues in the present Commonwealth Government were intimately familar. Mr. Gullett also says that to do what the cotton growers and manufacturers have asked would increase the cost of clothing to the workers. If he has read the Tariff Board's report he must know that this is not the case. In the evidence submitted to the Tariff Board the spinners have guaranteed that prices would not be increased, and a schedule was also submitted showing the prices which would rule in relation to world cotton values. Mr. Gullett's argument that to do the right thing by the industry would mean that a new charge would be added to the cost of living is, therefore, a specious plea for which there appears to be little justification. He further states that a duty of 50 to 60 per cent. would be necessary. He must know that the manufacturers did not ask for such a duty, that which they sought being 35 per cent. preferential, 48 per cent. intermediate, and 55 per cent. general. He further argues that cotton growers are not specialist farmers as they also engage in other branches of agriculture. This is just where the danger lies of serious damage being done to the primary industry, as a result of continued inaction. There are large tracts of territory in Central Queensland peculiarly adapted to cotton growing, and in those districts there are a large number of farmers who confine themselves to cotton. If, as a result of continued disappointment in the attitude of the Commonwealth Government, these men take up dairying they will never come back into cotton to anything like the same extent which at present is the case.

### No Tangible Security for the Cotton Grower under Existing Tariff.

The fact is that the areas of cotton planted were sown on the faith of the assurance which was given that the matter of the additional protection required for the manufacturers would be dealt with early in the parliamentary session just closed. That assurance has not been honoured, and it has been substituted for the assurance contained in Mr. Gullett's announcement to the effect that "a further statement upon the whole subject will be made early next session." The position, therefore, is that last year the cotton growers and manufacturers had an assurance that the matter would be definitely dealt with in the session just closed. This has now been transposed to an assurance of "a statement next session." This is not very tangible security upon which to plant extended acreages of cotton. The current season's estimated production of 6,000 bales could have been 40,000; in other words, £1,000,000 per annum of new wealth could have been created which is not in existence because of the doubt of the growers as to their market.

In conclusion, the Minister said that the Commonwealth Government is clearly guilty of failure to honour its obligations and to fulfill the assurances which were given by it and accepted in good faith by both growers and manufacturers. Apparently its assurances are worth nothing, and it is lamentable that Australian industries must stagnate as a result of the Commonwealth Government's failure to grant a perfectly reasonable and logical request. Meantime, the existing ridiculous state of affairs will apparently continue under which our cotton growers send their cotton overseas to find a market whilst the same ships bring back the manufactured article, and because of this many Australian citizens are unemployed.

**Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription —one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.**

# PASSION FRUIT CULTURE.

By ALBERT H. BENSON, M.R.A.C.

No recent publication dealing with the culture of this fruit having been issued by this Department, it is considered desirable to bring out a new pamphlet* dealing not only with the well-known passion fruit *Passiflora edulis*, but with the less known fruits, varieties of the same natural order "Passifloreæ," that can be grown here, such as the Grandailla, *P. quadrangularis;* the "Bell Apple," *P. laurifolia;* the Mexican Passion Fruit, *P. ligularis;* and the Banana Passion Fruit, *Tacsonia mollissima.* Other varieties of the same natural order are grown for the sake of their flowers and foliage, and the papaw, "Carica papaya," is a very near relative.

All passion fruits are climbers, and the varieties above referred to are either semi-tropical or tropical, and require a well-drained, friable, rich sandy loam soil to be grown to the best advantage; but the common passion fruit can be grown on comparatively poor soils that are naturally well drained, provided they are systematically manured, well cultivated, and are not subject to severe frosts. Stagnant water at the roots is fatal and very heavy soils should not be selected.

As with all other fruits the land should be thoroughly prepared prior to planting, so as to reduce it to a state of perfect tilth, and provide the right soil conditions in which to start the young plants. This is a matter of very great importance, and one that does not receive the attention it should, as not only passion fruit but all other fruits are frequently planted in land that is very far from being in good order, and which should have received much more care and attention in order to enable it to produce healthy vigorous plants that will yield payable returns. Slovenly work is never a success in any branch of fruit culture; and nothing is "good enough" except the best; in fact, as far as the fruit itself is concerned, the only fruit in which there is any profit is "the best."

## *Passiflora edulis*—Purple Passion Fruit.

This variety is the one that is most commonly grown, not only in Queensland, but throughout Australia. There are at least two types, the large fruited or "giant" passion fruit, sometimes called "Mexican," which attains a size of over 2 inches in diameter, and the common type which averages about 1¾ inches in diameter. The former, though a larger and more showy fruit, is somewhat disappointing, as it is frequently a shy bearer and the fruit does not contain as large a percentage of pulp as the common type, which is the best all-round commercial fruit. The best fruit has a very dark purple skin, which is filled with an orange-coloured pulp in which the seeds are imbedded. The pulp is slightly sub-acid and possesses a very distinctive agreeable flavour, so that when used as an ingredient of a fruit salad it imparts its characteristic flavour to it, and the salad is greatly improved thereby.

The plant is easily propagated from seed, all that is necessary being to select perfect fruit, fully mature, from a perfectly healthy plant that is free from leaf, root, vine, or fruit affection of any kind. The pulp, when removed from the fruit, should be placed in a tub or suitable vessel, and be covered with water, the mass being then allowed to ferment long enough to free the seeds from the pulp, when they should be strained off, well washed, and dried. If early spring ripened fruit is selected and the seed is planted as soon as ready, good strong plants will be available for summer planting, but if plants are wanted for early spring planting the seed must be sown the previous autumn. The seed should be sown in a specially prepared seed bed in soil of a light, free nature, containing a quantity of leaf mould or humus—a good potting soil—and the young plants should be sheltered from the sun and judiciously watered should the soil become dry. When the seedlings are about 1 foot high or larger they should be planted out in the permanent position, taking care to keep them moist so that they will not dry out.

Prior to planting, the land is marked off in rows not less than 10 feet apart. A trellis consisting of good fencing posts, placed 15 feet apart in the row, is erected along the row, the posts being set with their width across, not in the direction of the row. The posts should be about 8 inches wide by 3 inches thick by 6 feet 6 inches long, and be set 18 inches in the ground and 5 feet out of the ground. The end posts must be much heavier and be well strutted as they have to act as strainers, and prevent the wires that are attached to the top of the posts from sagging when they have to carry a heavy growth of vines. Two No. 8 galvanised wires are firmly fixed to the top of the posts, one on each side, so that when in

* These notes were published originally in the "Q.A.J." for March, 1926, and are reprinted in response to numerous requests.—Ed.

PLATE 88.—THE LARGE-FRUITED GRANADILLA.
Carrying specimens 9 in. x 17 in. circumference, grown by Mr. J. C. Brünnich, in his garden at Stanley Terrace, Taringa, near Brisbane.

position they form two parallel lines, 8 inches apart, on which the vines are trained. The young plants are planted midway between the posts, right under the wires, and are tied to a light stick or other temporary support till they reach the height of the wires, when they are topped and two main lateral stems are allowed to develop, all other lateral growths on the main stem from the ground to the wire being removed. The two main laterals are then trained on to the wires, and when they meet those of the adjacent plants their growth is stopped by pinching back the terminal growth, which causes secondary laterals on which fruit is borne to be thrown out all along the main lateral. These secondary laterals, if left alone, throw out further laterals and these again in turn make more lateral growth, with the result that a very dense and tangled growth of vines is produced from which it is hard to separate the primary and secondary laterals and which, owing to its dense habit of growth, is frequently prone to be attacked by disease. Systematic pruning is therefore desirable—first to keep the plants healthy, secondly to produce strong new lateral growth on which good fruit will be grown, and thirdly to bring in the crop at different periods of the year, so as to get a better distribution of the crop instead of a glut at one time and a scarcity at another. When an autumn or winter crop is desired the main summer crop must be sacrificed. This is done by pruning the vines right back to the secondary laterals when they are showing their blossoms for the summer crop, and this will have the effect of throwing out a new growth which will blossom at a later period. A word of warning is, however, necessary; don't prune hard back in dry weather—you will probably kill the plants if you do so—but wait till the ground has had a good soaking, when the plants will throw out a fresh growth very quickly and will not be permanently injured. A good dressing of quick-acting manure at this time will be found beneficial and materially increase the following crop.

Mr. Brünnich, in his last edition of "Complete Fertilisers for Farm and Orchards," recommends the following manure for passion fruit:—

> "Use per acre, in accordance with the richness of the soil, a mixture of—1 to 2 cwt., nitrate of soda; 4 to 8 cwt., blood and bone manure; 1 to 2 cwt., superphosphate; 1 to 2 cwt., sulphate of potash. A top dressing of 1 cwt. of nitrate of soda in spring will be found beneficial."

This is a complete manure rich in organic and inorganic nitrogen, citrate and water soluble phosphoric acid as well as potash, and should not only act quickly but be fairly lasting in its effect.

The passion fruit is liable to be attacked by several different pests of which the leaf disease is by far the most serious. This disease has only made its presence felt during recent years, and so far no remedial measures have been found very efficacious. The disease is of an obscure nature and attacks every part of the plant above ground—the flowers, leaves, and laterals. The latter are killed by a small portion of the stem becoming affected to such an extent that it dies and all the rest of the lateral that is beyond the part attacked shrivels and dies, frequently when it is covered with fully grown but immature fruit which shrivels up. The affection has received the careful attention of the Vegetable Pathologist, and that the result of his investigation has proved it to a new fungus controllable by Bordeaux Mixture. Red spiders and spinning mites frequently injure the leaves and young laterals. These pests can be kept in check by spraying with sulphide washes or dusting with finely-ground sulphur.

Scale insects of various kinds also attack the wood, leaves, and fruit. These may be kept in check by systematic spraying, but this can only be effectual when the vines are systematically pruned, as when grown in a dense mass the spraying material used has little chance to come in contact with the majority of the insects.

Nematodes injure the roots, and here the use of materials that can be worked under the soil such as cyano-gas are well worth taking. Fruit fly also attacks the fruit, as does also a sucking bug. The latter sometimes causes a heavy loss, as the punctured fruit either drops or if it remains on the vine becomes hard and woody. This bug is very fond of the red prickly cucumber, commonly known as the "Cape or African Cucumber," and if this is used as a trap, a large number of the bugs can be caught and destroyed.

When fruit fly is troublesome, trapping with Harvey's (B) fruit fly lure as soon as the first sign of the fly's presence is seen and systematically attending to the traps will result in the destruction of large numbers of female flies, and thus reduce the loss they would cause were they allowed to lay their eggs in the immature fruit whilst the skin is still soft and before it becomes so hard that the fly cannot pierce it. As showing the attractiveness of the (B) lure the writer has recently caught no less than 1,200 Queensland Fruit Flies (*C. tryoni*) in one glass trap in five weeks,

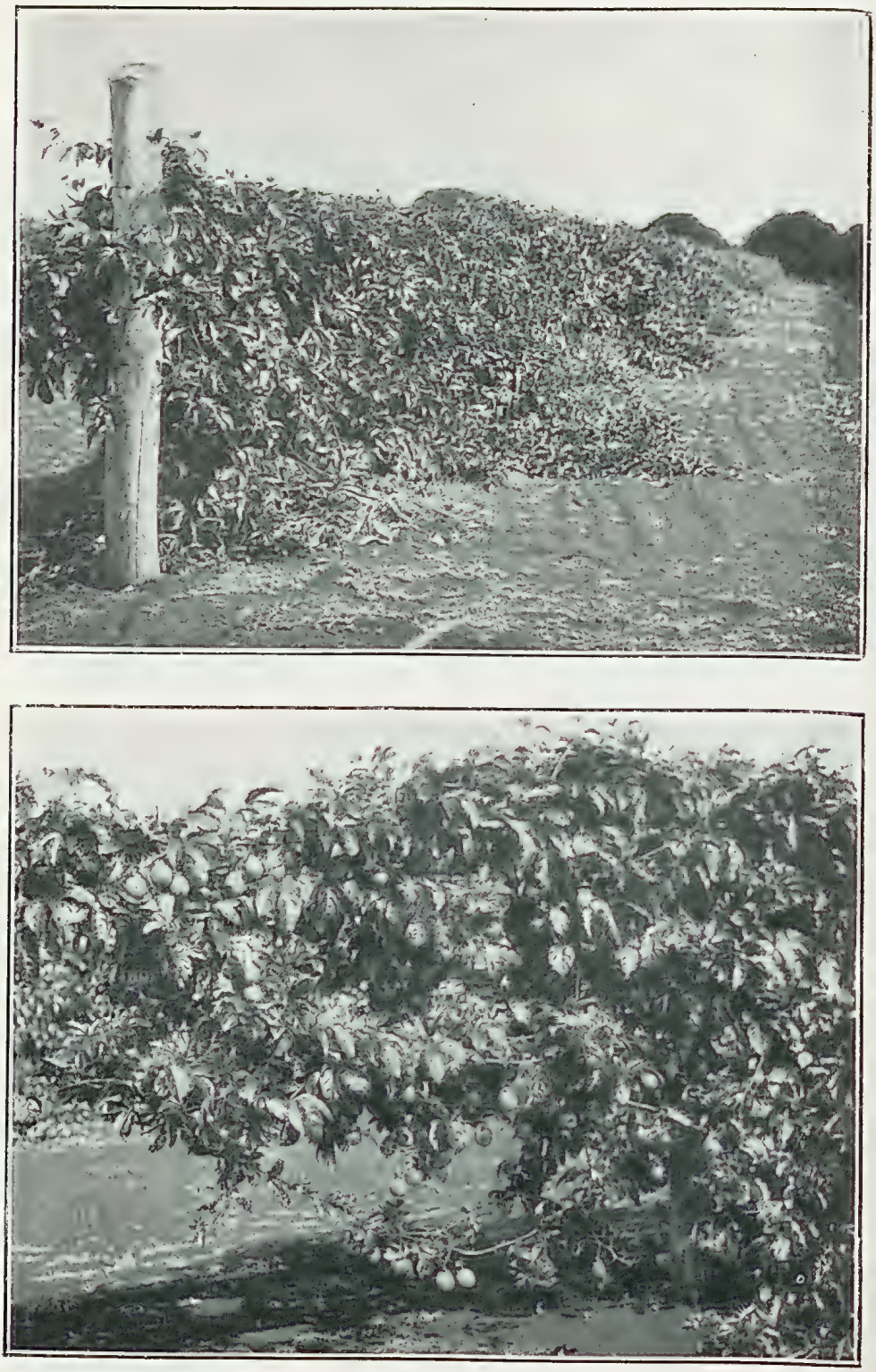

PLATE 89.—PASSION FRUIT, REDLAND BAY, SHOWING METHOD OF TRELLISING AND PART OF A VINE IN FRUIT

of which nearly 80 per cent. were females, many being full of matured eggs ready to be deposited; so that systematic trapping with an effectual lure will undoubtedly tend to reduce the loss caused by this very destructive insect.

***Passiflora quadrangularis*—Granadilla.**

The granadilla is a tropical fruit that is better suited to the northern than to the southern part of this State, though excellent examples of the larger type of granadilla—"*Macrocarpa*"—can be produced in the coastal districts both to the south and north of Brisbane, provided the situation is a warm one, free from frost and well protected. The *macrocarpa*, as its name signifies, is a very large type of granadilla, the fruit frequently weighing several pounds. The seed cavity is small for the size of the fruit, and is surrounded by a thick layer of whitish flesh which has no distinctive flavour, but which, when flavoured with lemon or other suitable flavouring, is used for pies. It is not as a rule a heavy bearer, and must be grown on a horizontal (not lateral) trellis.

The Northern Granadilla—*quadrangularis*—is a smaller fruit of a somewhat irregular, oblong shape, about 4 to 4½ inches in diameter. The pulp cavity is large and is filled with large seeds surrounded with a pale yellow pulp of exceptionally high flavour when the fruit is fully ripe, which is known by the outer fleshy covering becoming soft, and the skin, instead of being a pale green, turns a dull yellowish-green colour. This variety when fully ripe is one of the highest flavoured tropical fruits, and eaten either alone or used in combination with the papaw, pineapple, banana, and the juice of a lemon or lime to form a fruit salad, it is very hard to beat. Unfortunately, it does not carry well and consequently can only be obtained in perfect condition where grown. The granadilla requires a deep, well-drained, rich loamy soil to be grown to perfection, and it does best when trained on an overhead trellis (as shown in illustration herewith, which was taken recently at Taringa, near Brisbane, and gives a good idea of its habit of growth). Similar manuring to that recommended in the case of the common passion fruit will be found beneficial.

***Passiflora laurifolia*, "Bell Apple."**

The Bell Apple is not grown to any extent in this State though its fruit is quite equal to that of the previously mentioned varieties. It is a handsome and vigorous climber, and is more valuable for covering unsightly edifices or for ornamental purposes than for fruit production, and its cultivation for the latter purpose is not recommended. Without hand fertilising it carries but few fruit.

***Passiflora ligularis*, Mexican Passion Fruit**

May be eliminated from the list. The pulp is flavourless beyond a trace of sugar.

***Tacsonia mollissima*, the Banana-shaped Passion Fruit.**

Although this fruit has been seen in fruit shops of the Southern States for some years, it is only recently that it has been met with in our local markets. Some time ago a quantity of fruit was offered for sale locally, and met with a good demand at a very satisfactory price. It is not, however, advisable at the present time to plant this variety extensively, despite the attractive appearance of the fruit, as a taste for it will have to be acquired and a demand created before there will be a market for any large quantity of the fruit. Its culture is similar to that of other passion fruits and it is hardier than the more tropical varieties.

**If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.**

# THE CHESTER WHITE BREED OF PIG.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

With a view to testing their suitability for climatic conditions and their adaptability to Queensland market requirements, some breeders—Messrs. Brown Bros. of Mooroombin, Toogoolawah, and Percy V. Campbell of Lawn Hill, Lamington—have purchased a pair each of Chester White boars and unrelated in-pig sows. These pigs were in company with a consignment of Duroc-Jersey pigs shipped at Vancouver, B.C., early in January, 1929, and after a protracted voyage were delivered at Sydney on 23rd February.* After a period in quarantine at Sydney, they were delivered at Brisbane on 16th March, after nearly two and a-half months on an ocean journey. The pigs arrived in good order and condition and are considered to be typical representatives of their breed.

## Historical Note.

As with several other American breeds with which breeders here have had experience, the Chester White originated in Chester County, Pennsylvania, U.S.A., and have for many years enjoyed a widespread popularity in the United States and Canada, where they are looked upon as a useful farm type, especially suited for cross-breeding purposes for the production of a popular type of butcher and bacon hog.

The record of the Chester White, according to the well-known authority, Mr. H. C. Dawson, is somewhat enmeshed in historical uncertainties, but it is known that the old Bedfordshire breed was being handled in that region at the time the first Chester Whites appeared on the scene. Those were the days when farmers did not spend much time indoors and when fountain pens, typewriters, and dictaphones were scarcely even thought of, and when herd book societies, especially organised for the purpose of recording pedigrees and fostering the interests of pig producers, were but in the making. In the year 1818 Captain James Jeffries imported white pigs from Lincolnshire, England (these were evidently of the Lincoln curly coated type), and at about the same time English and Chinese hogs were imported from England. Both were generally white in colour (the Lincolnshire pig curly in the coat), but both had black or blue spots over the body. These spots have since been largely eliminated from all the white breeds, though all show a tendency to occasionally throw progeny with odd black and blue smudges on the body.

There were also white hogs in Pennsylvania previous to these importations, but they, like many pigs of their time, were of a slow-growing, late-maturing type. As with the early development of Poland-Chinas and Duroc-Jerseys, breeders interested in the white pig used blood from the various white breeds available, and from the progeny of these, by careful selection and judicious handling, they developed a type permanently white in colour and free from the undesirable dark coloured markings.

In America, as in England, the white pigs soon gained favour, especially in the country surrounding the city of Pennsylvania and in the pig-raising areas of Ohio. Of the progeny of these early strains some were of an extremely large, coarse, slow-maturing type, while others were of lighter build and were more compact, and grew rapidly. Some of this blood was used in moulding the Poland-China, and doubtless also white pigs were originally used with red stock in the production of the Duroc-Jersey.

Among early breeders of the Chester White type may be mentioned the Todds, of Ohio, progressive farmers who originated the type known as Todd's Improved Chester between 1860 and 1870, and which eventually came to be known as the Improved Chester White. L. B. Silver, also of Ohio, developed another type from stock which he bred from Todd's strains, his requirements being more along the lines of light, quick-growing pork pigs. He was so successful that Silver's pigs finally became known and registered in the herd book in 1884 as the O.I.C. breed (Ohio Improved Chester).

Thus the Chester White is one of the oldest of the pure American breeds, and for thirty years or more they have been regarded as the butcher's model, though Queenslanders must remember that the most popular pork pig in America is of much heavier build and carries much more weight than our porkers here. Many American authorities classify the Chester White as one of the lard breeds—that is, the pig intended more for the production of fat than of flesh—but possibly climatic conditions and environment in Australia may alter this fat-producing tendency. Some authors say the pigs are not active, though they possess good capacity for development and are good feeders. The specimens we have are certainly long-bodied, growthy types, but there is a variation in the nature of the coat, one strain having fine straight hair and another a longer coat with a tendency to curl.

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* Included in this shipment also were Duroc-Jersey pigs for Mr. Leo Delroy, of Murgon, and Mr. W. Koehler, of Yamsion, via Dalby.

In the development of the pigs that came to be known as the Improved Chester White, and which were developed by the Todd Brothers in 1830, pigs from New England, Delaware, and other counties were used. Some of these were known as Irish Grazers, others as Norfolk Thin Rhinds, and still others as Bedfords. In 1835, Joseph Haskin, a Massachusetts breeder, came to live in Ohio and brought with him stock known as the Byfield breed and the Thin Rhind strain, and it is but natural to presume (as is done in Australia), when there are a few breeders of any one particular type, and where unrelated strains are limited, a good deal of interbreeding goes on, and one borrows or buys from another and keeps only the best of the stock produced as foundation stock.

Later records show that another local breed of pig also had a part in the early make-up of the Chester White, the latter breed being introduced by one Joel Meade, of Norwalk, Ohio. His pigs were noted for their ability as grazers, and suited admirably the open-air system of pig-raising popular even in these days.

In 1862 a strain known as the Normandy hog (probably of French origin) appears to have been utilised in building up the improved type of Chester White. Thomas Wood, of Pennsylvania, was also interested in this breed, and shared many of the honours with the Todd brothers at the country stock shows for which America has been famous for generations.

## Breed Characteristics.

It is apparent from a close study of all these records that there is no distinct relationship between the Poland-China, Duroc-Jersey, or Chester White pigs, though they are all of similar type and all have the small lopped ears characteristic of the American types. At the same time they were all bred and developed under similar environment, the colour having been distinctly a matter of fancy, and having been developed by the introduction of strains carrying the largest proportion of the most desirable colour; thus the fanciers of the Duroc-Jersey specially selected breeding stock of a cherry-red colour, the Poland-China enthusiasts stuck to the black and white, while the Chester White fanciers developed a pig wholly white in colour without reversion to the older multi-coloured hogs.

*Weight.*—In those days hogs of 1,000 lb. in weight were the special fancy of many breeders, and the use of large coarse hogs, so undesirable now, was forced on many breeders, even against their will.

*Colour.*—The hair of the Chester White pig in its several forms in America still shows a tendency to coarseness, and curly-coated pigs are not uncommon. Some of the original strains had a distinct tendency to sunburn and sunscald, and, of course, had to be eliminated. Some of the original Thin Rhind breeds—black spotted with white, or white belted with black—had this fault, and it has only been by careful selection over many years that this fault has been bred out of the white, black and white, and belted breeds (the Hampshires).

*Prolificacy.*—All records show the Chester White to be a prolific and hardy breed, and many breeders are of opinion that the sows of this breed are even better endowed with maternal instincts than the sows of the other breeds to which reference has been made.

*Early Maturity.*—One writer, in referring to their early maturing tendencies, says that it has been estimated that the Chester White will show an average gain under good conditions of 1 lb. in weight for every 3 lb. of feed given.

## Standard Points.

The head of the Chester White shows a straight face, somewhat like that seen in the Poland-China, but slightly more dished. The nose has a tendency to be rather long and narrow. The ears are large, coarse, and droop forward in a manner similar to the Poland-China, but the droop or break is usually further from the tip; as a rule, too, the ear is somewhat heavier, and it is quite common for it to be loosely attached. The eyes are large, bright, and usually wide-set. It is undesirable that they should be surrounded by ridges of fat or puffy flesh, as this may affect the sight. The neck, jowl, and shoulders are full, well fleshed, and in the most approved types merge gracefully with the neck and body, the latter being long and of good depth. The chest of necessity needs to be wide, long, and deep, allowing for free action of the heart and lungs. The long, deep body permits of free action of all the digestive organs and gives to the animal a very attractive appearance from the standpoint of the bacon curer. The breeding organs also require ample room to permit of the development of thrifty litters. For preference the back should be long, but slightly arched—the rainbow-backed, stilty-legged type, being quite undesirable from the Australian point of view. Strong loins connecting up with the body, whose ribs are long, flat, and well sprung, allow for the development of weight and flesh.

Whether there will be present in the Chester White pigs produced in Australia heavy, coarse-boned legs remains to be seen; the fault is mentioned, for some of the American strains show distinctly coarse bone. Some authors seem to indicate leg weakness as a result of coarse, soft bone, but probably this fault also will be overcome by strict attention to selection. It is likewise hoped the Chester White will carry a roomy, deep, and well-fleshed ham, for under our conditions pigs need long, deep bodies and particularly well-developed hind quarters in order to attract the buyer's attention and realise top prices.

It is doubtful if the Chester White will, in so far as development of ham is concerned, be able to give a lead to the Poland-China, for the latter breed invariably carry really good hams, but the Chesters appear to carry greater length, and this no doubt accounts for their prolificacy. The colour of new breeds is always a problem with judges, but the colour of the Chester White is whole white, no black hair being admissible, though it is common for a certain number of black and bluish spots to show on the skin. As already stated, the objective is to eliminate these; hence strains showing an absence of dark spots, and being otherwise of equal merit, would be given preference.

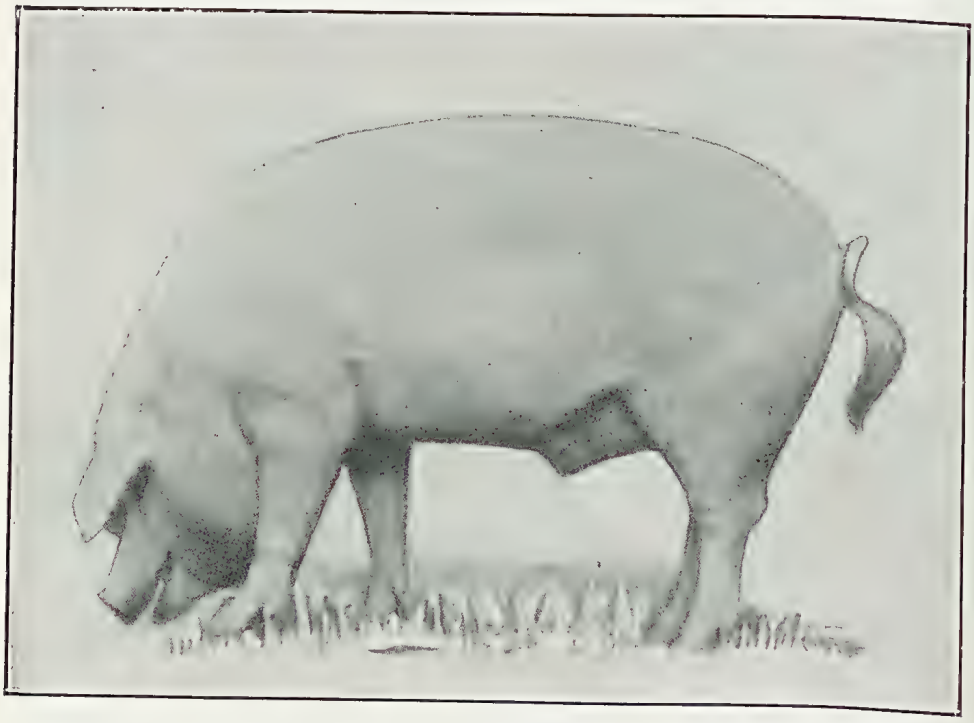

PLATE 90.—GRAND CHAMPION CHESTER WHITE, BARROW INTERNATIONAL LIVE STOCK SHOW, U.S.A., 1927. SHOWN BY ALBERT H. STUART, OF WHITEHALL, IOWA.

Points worthy of note: Type and body development, colour, and shape of ears. Note—It has been difficult securing a really good photograph of a Chester White with which to illustrate this article, but the above appears to represent a type popular in the United States where many of the pigs appear leggy and rainbow backed. In Queensland the long, level backed, deep sided and well developed hindquartered pig is the most popular.

For cross-breeding purposes doubtless the Chester White will be found to give excellent results where used on types like the Berkshire, the Tamworth X Berkshire, and the Yorkshire. It is problematical whether they would cross well with the larger breeds like the Gloucester Old Spot or Large Black, or with the Tamworth, but possibly good results would be obtained by using sows of the Poland-China type with boars of the Chester White breed.

These are all points on which further details will be made available as time goes on. Details regarding the registration of these pigs and with regard to their standard of excellence may be obtained on application to the Secretary, Australian Stud Pig Breeders' Society (Queensland Branch), 3 Inns of Court, Adelaide street, Brisbane, or from the author of this article, from whom also other particulars may be obtained.

# Answers to Correspondents.

**Dairy Cattle Judging—Scale of Points.**

A.L.D. (Bundaberg)—

The ratio scale of points adopted by the Queensland Jersey Cattle Society is as follows:—

| | Maximum Points. |
|---|---|
| 1. Head—Fine; face dished, showing pure Jersey character; cheek fine; throat clean | 10 |
| 2. Nostrils—High and open; muzzle encircled by a light colour | 3 |
| 3. Horns—Small and incurving; eye full and placid | 4 |
| 4. Neck—Straight, thin and long, and lightly placed on shoulders | 3 |
| 5. Lung capacity as indicated by width and depth through body immediately behind the shoulders | 4 |
| 6. Barrel—Deep, broad, and long, denoting large capacity; ribs rounding in shape | 10 |
| 7. Back—Straight from withers to setting of tail; croup and setting on not coarse | 4 |
| 8. Withers—Fine and not coarse at point of shoulders | 2 |
| 9. Hips—Wide apart, rather prominent, and fine in the bone | 4 |
| 10. Hind Legs—Squarely placed when viewed from behind, and not to cross or sweep in walking | 2 |
| 11. Tail—Thin, reaching the hocks, good switch | 2 |
| 12. Udder—Large, of good flexible quality and not fleshy, quarters well divided | 10 |
| 13. Rear Udder—Well up, protruding behind and not rounding abruptly at the top | 10 |
| 14. Fore Udder—Full and running well forward | 7 |
| 15. Teats—Of good uniform length and size, wide apart, and squarely placed | 3 |
| 16. Milk Veins—Large, tortuous, and prominent | 4 |
| 17. Richness—As indicated by a yellow colour on horns, escutcheon, and inside of ears | 3 |
| 18. Skin—Thin, loose, and mellow | 2 |
| 19. Growth | 3 |
| 20. General Appearance—Denoting a high-class Jersey and economical dairy cow. Clipped or shaved animals not recommended | 5 |
| Registered Pedigree | 5 |
| Perfection | 100 |

A mature cow in good condition may run from 650 to 850 lb. live weight.

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## BOTANY.

*Replies selected on account of their general interest from the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.*

**Wild Millet.**

W.J.P. (Wetheron, Gayndah Line)—

Your specimen of grass is *Panicum colonum*, commonly known in Queensland as Wild Millet. It is a grass very widely spread over the warmer regions of the world in cultivation. It has considerable value as a fodder, and is generally looked upon as one of the parents of the well-known fodders Japanese millet and White Panicum. Seed is not obtainable through the ordinary commercial channels, but seeds of the fodders mentioned are of course obtainable, and these yield a much heavier amount of fodder than the wild form.

**Cattle Bush—Sandlewood.**

A.B.G. (Kowguran)—

No. 1 is *Pittosporum phillyræoides*, commonly known as Cattle Bush. It is a small tree, with a very wide distribution in Southern Queensland, New South Wales, and South Australia, and is generally regarded as an excellent fodder tree.

No. 2 is *Santalum lanceolatum*, a species of Sandalwood. I do not know that it is of any fodder value. This tree is rather interesting. It occurs in the north-west of Western Australia, in the Northern Territory, throughout most of Queensland, and in a good part of New South Wales. In the Kimberleys, the Northern Territory, and Northern Queensland, the tree produces a valuable sandalwood, largely exported to the East. In the most southern parts of the State, however, and in New South Wales, the wood loses all, or practically all scent, and is in consequence valueless, though the southern trees and northern trees seem much the same in the field.

**Rattle Pod—*Phaseolus semi-erectus*.**

E.F.D. (Bowen)—

No. 1 is *Crotalaria striata*, a species of Rattle Pod. This plant has a wide distribution over the Tropics, and is cultivated in some countries as a green manure, particularly for tea. A bad feature of it, however, is that it is poisonous to stock, and a pamphlet on it in this respect has been posted to you.

No. 2 is *Phaseolus semi-erectus*, a native of Tropical America, but now a naturalised weed in most tropical and subtropical countries. It was originally introduced into Queensland as a fodder, though as far as my experience goes, stock do not seem to care for it.

**Mulga. Bendee. Desert Poison Bush.**

E.M. (Hamilton Downs)—

1. *Mulga Acacia ænura*.—A well-known fodder of Western Queensland, and not known to be poisonous in any way.
2. *Bendee Acacia curvinervia* (broad leafed form) *Acacia* sp. (narrow leafed form).—These are not known to be poisonous.
3. *Gastrolobium grandiflorum*.—Very common in parts of Western and North Queensland, the Northern Territory, and the Kimberley district of Western Australia. It is variously known as Desert Poison Bush, Heart Leaf Poison Bush, and Wallflower Poison Bush. It is one of the worst poisonous plants we have and the poison does not disappear when the plant is cut and dried. At what stage the plant is most poisonous we are not in a position to say. The symptoms of poisoning are convulsions and usually blindness.

***Euphorbia prostrata*—*Euphorbia Drummondii*.**

INQUIRER (Winton)—

1. *Euphorbia prostrata*, a red or reddish weed lying flat on the ground, common about townships in Queensland. It is widely spread over the world, but is a comparatively recent introduction into Queensland. It is not known to be poisonous, though all Euphorbias should be looked upon, perhaps, with suspicion.
2. *Euphorbia Drummondii*, the Caustic Creeper. This plant is poisonous to sheep. It has been found to contain a prussic-acid yielding glucoside, and if eaten then in any quantity death soon follows. We have examined a fair number of Queensland samples of this plant, but have only found rather doubtful traces of the glucoside and, therefore, its formation I should say is comparatively rare. There is also evidently another poisonous principle that has not been extracted, as it causes symptoms very different from those caused by a prussic-acid yielding glucoside. The chief symptom is a considerable swelling in the head and neck. Experienced sheepmen say that if this swelling is pierced a clear, amber-coloured fluid runs out, and the life of the animal may be saved. The amount of weed necessary to cause these symptoms we cannot state. It probably varies according to the stage of growth of the plant.

### The Stink Grass.

W.E. Co. (Toowoomba)—

The specimen is *Eragrostis major*, the Stink Grass, so-called from the peculiar odour the grass gives forth. It is an annual grass, a native of Southern Europe, now widely spread over practically all the temperate regions of the globe. It is palatable to stock only in its young stages. Later on it becomes coarse and does not seem to be touched. It has no importance as a fodder.

### Pigeon Grass.

E.A.S. (Millaa Millaa)—

The specimen is *Setaria aurea*, commonly known as Pigeon Grass, on account of birds being rather fond of the grain. It is a grass that favours, as a general rule, rather wet, swampy situations, and in such has some value as a fodder. We should not think it likely to spread and prove a nuisance.

### Western Plants Identified.

Inquirer (Elderslie, Winton)—

1. *Amarantus Mitchellii.* An Amaranth. Not poisonous.
2. *Polanisia viscosa*, a small member of the Caper family. It is very abundant, but we have not heard a common name for it. It is not known to be poisonous in any way.
3. A plant of the Convolvulus family. We should say *Polymeria longifolia*, but the specimen is rather young to be sure. Plants of this family are very common in the general mixed pastures of Western Queensland, but are generally regarded as quite wholesome.
4. *Amarantus Mitchellii.* The same as No. 1.
5. *Trianthema decandra.* Hog Weed. It is not poisonous so far as known.
6. A plant of the Mallow family—Malvaceæ—but too young to determine specifically. Plants of the Mallow family are on the whole quite wholesome.
7. A plant of the Mallow family, too young for specific determination. Possibly the same as No. 6.
8. *Phyllanthus thesioides.* No common name. It is fairly frequent, and is not known to be poisonous or harmful in any way.
9. *Boerhaavia diffusa.* Tar Vine. It is not poisonous; in fact, it is generally regarded as a useful fodder.
10. *Trianthema decandra.* Hog Weed. Not poisonous so far as known. Very common. An older growth of No. 5.
11. *Marsilea Drummondii.* Nardoo. It is not poisonous.
12. *Corchorus hygrophilus.* No common name. It is not poisonous.
13. *Trianthema crystallinum.* No common name, but the plant is allied to the Pig Weeds. It is not poisonous.

We should regard none of the thirteen specimens as dangerous. All are more or less common weeds in Central-Western Queensland.

### Native Sorghum.

W.T.P. (Moore, B.V. Line)—

Your specimen is a species of Sorghum, and we should say the native form of *Sorghum halepense*, commonly known as Native Sorghum. The Sorghums, however, are rather difficult to determine specifically in the absence of specimens from the basal part of the plant showing the root system. The Native Sorghum differs chiefly from Johnson Grass in that it is a perennial with small buds arising at the base of the plant. The Johnson Grass possesses long, white, underground runners or rhizomes. Sudan Grass is closely allied to both but differs in being an annual of finer growth. Like practically all the Sorghums a certain amount of danger is to be expected in feeding the plant. It is best to wilt the plant slightly before feeding, though cases of poisoning by it are not very numerous. The poisonous principle is a prussic acid-yielding glucoside.

### Brown Top—Blue Grass.

W.B. (Chinchilla)—

1. *Pollinia fulva,* Brown Top. This grass has rather a mixed reputation. In New South Wales it is generally regarded as an excellent fodder plant, sweet and palatable to stock, but in Central Queensland it is very common and is generally looked upon as being coarse and innutritious. It seems to vary a good deal according to situation, and only local experience will tell you the value of the grass in your district.

2. *Andropogon intermedius,* a species of Blue Grass. It is a rather coarse grass, but provides fair amounts of leafy forage.

### Yellow Grass *(Paspalum conjugatum).*

W.T. (Pomona)—

Your specimen is *Paspalum conjugatum,* known in North Queensland as Yellow Grass or Sour Grass. It has an evil reputation in the wetter, warmer parts of the Atherton Tableland, taking possession of pastures, and written down by farmers there as next to useless for dairying purposes. The grass is a tropical one and only seems to have made its appearance in South Queensland in the last couple of years. It is very common in New Guinea, mostly on the rubber plantations, and we have seen working mules there do fairly well on it.

### Chinese Burr.

J.H. (Miriam Vale)—

Your specimen is *Triumfetta rhomboidea,* the Chinese Burr, a common plant in Northern and to a lesser extent in Central Queensland. It is a very obnoxious plant if it gets a foothold. It is spread by its burr like seed vessels which adhere to clothes, feet of animals, and similar means.

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## PIG RAISING.

*Replies selected from the outgoing mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton.*

### Skim Milk for Pigs.

A.G.H. (Rosewood)—

Skim milk may be successfully fed to pigs, either in a fresh state as it comes from the separator, or after it has curdled owing to acid formation.

On coming from the separator the skim milk should be allowed to stand for a short time, then the froth taken off, otherwise the pigs may get a stomach full of froth and this may cause colic.

Allowing the skim milk to stand for twelve hours or more in a barrel so that there is sufficient acid to curdle it is a good practice, provided the barrel is cleaned out thoroughly after each lot of milk has gone through it, but in practice we often find that the barrel used is in a filthy state and the milk in it, not only becomes sour and curdled but it becomes putrid owing to the growth of putrifactive organisms. So for safety, it may be better to feed skim milk after standing for about an hour after separating and before feeding to the pigs.

Skim milk alone is not a very good ration though it is a very valuable food for pigs. For best results it should be fed in conjunction with grain, green food and roots, or pumpkins and melons. To get the greatest feeding value from a given quantity of skim milk, it should be fed with grain in the proportion of 3 or 4 lb. of grain to 1 gallon of skim milk.

It is important in feeding slop foods to pigs that the troughs should be cleaned out regularly and not allowed to become filthy. A weekly wash out with a scrubbing brush and a bucket of disinfectant solution does a lot to keep the pig trough in a sanitary condition. Of course, disinfectant should not be left lying near or in the pig trough as it is poisonous to pigs.

**Abscessed Ear.**

W.Y. (Lagoon Pocket, Mary Valley)—

The trouble is due to accidental causes, and has probably been brought about by a bite from a dog or from another pig. The wound thus inflicted has not healed properly and has become pathogenic (disease-producing), and as a result pus formation has been set up, and this accumulation of pus enclosed under the thick skin of the ear has produced the abscess to which you refer.

We have observed the complaint more among breeds like the Large Black whose ears are large and pendulous than among breeds like the Berkshire or Tamworth whose ears are smaller and more erect in growth, although all stock are subject to abscesses. See pamphlet "Castration of Pigs" for references to other forms of abscesses productive of much pain and loss of condition.

Treatment in cases of this description is best effected by lancing the abscess in some convenient spot so that the pus can drain away and let the wound be cleansed, a cut at least 1 in. long should be made, and when the pus has been forced out the wound should be syringed out with a strong disinfectant solution and then be plugged with cotton wool, and kept open by the daily renewal of washing and plugging. Smearing the wound with one of the ointments suggested in the castration pamphlet is also advised.

The trouble is not due to defective feeding or over feeding, but is due to permitting mature stock to run with the young stock and to feed together. Some sows and boars are very savage and snap and bite at other pigs, injuring them and causing disturbance in the sty.

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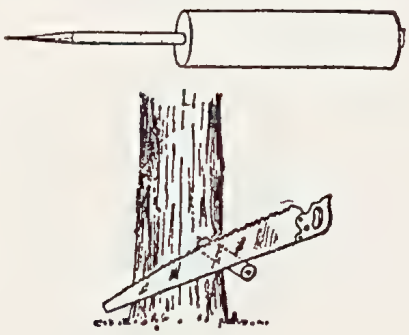
## SUPPORT FOR CROSS-CUT SAW.

The felling of trees by means of a one-man cross-cut saw is a very tiresome task, due to the difficulty of holding the saw at the proper angle while the cut is being started.

To overcome this in a very simple manner, one farmer has employed the roller support herewith shown.



A 12-inch length of ⅝-inch steel rod was sharpened at one end, and a wooden roller mounted upon same by shrinking a nut over the rod 3 inches from the pointed end, and threading a nut on at the blunt end.

Before starting the cut into the side of the tree, the point of the roller device is driven into it at a determined point. The saw may then rest upon the roller as it is drawn back and forth, making a clean cut at the desired angle without undue strain or exertion upon the part of the operator. A slight twist will remove the roller after the saw is removed.

## POWER KEROSENE—ITS USE IN TRACTORS.

The tractor farmer looks at his fuel from a somewhat different viewpoint to the motorist. His first consideration should be work done per unit volume of fuel. He is using his tractor in the production of income, therefore a fuel that will enable him to cover a greater acreage with his various farm implements is the one to which he would naturally wish to give preference.

Some power kerosenes are excessively volatile, and while they may give slightly quicker switch over from motor spirit, they show a high consumption, and are prone to detonation when the engine is heavily loaded or carbonised. It is generally recognised that it is impossible to exaggerate one characteristic in a fuel without sacrificing others which may be even more important. Extreme volatility is invariably accompanied by heavier consumption, and is therefore to be avoided. Of far greater importance than mere ease of starting is the production of the highest degree of working power under continuous conditions of running.

In Australia, "Cross" kerosene has come to be looked upon as the standard fuel for tractors and spark ignition kerosene engines. While allowing a sufficiently quick switch over from motor spirit, it will idle readily and pick up without spluttering or hesitation and consequent loss of power.

### Best Operating Temperature.

An important point which is so often overlooked is the fact that a tractor should not only be thoroughly warmed up before changing over to kerosene, but should be operated throughout at a comparatively high temperature. Competent authorities have definitely laid it down that the most efficient working is obtained when the water in the radiator is at a temperature of 175 to 180 deg. Fahr., or even slightly more. This enables complete vaporisation of the fuel, allowing it to produce its power to the utmost limit.

Undoubtedly the chief consideration is the area of ground which can be worked per gallon. The attainment of this object is influenced by the relative volume of heat units per gallon of kerosene, and this is found to be highest in "Cross." Naturally, when these extra heat units are converted into tractive power, a correspondingly greater amount of work is obtained per gallon. This should not be overlooked, as it amounts to an appreciable saving on the year's working.

The ability of a fuel to function under heavy loads without "knocking" or "pinking," as it is variously called, is also a consideration of no little importance. The tendency to "pink" is inevitably accompanied by loss of power, which in turn increases the amount of fuel used. There is, as well, heavier wear and tear on the engine parts from this cause.

### Effect on Lubricating Oil.

As every tractor owner knows, a certain amount of dilution of the oil in the crankcase is inevitable. While efforts to make tractor lubricating oils better able to resist crankcase dilution have lessened the evil, prevention is better than cure, and the use of a kerosene which is proved to have the least tendency to dilute the oil is highly desirable. Here again "Cross" has established itself in general favour, and working tests have substantiated the claim made for it that its tendency to dilute the crankcase oil is at a minimum.

To sum up: firstly, see that the engine is kept hot. If necessary, the radiator shutter should be kept closed for this purpose; secondly, use a fuel that will enable the most work to be done—that is to say, a kerosene which possesses the greatest number of heat units per gallon. With these conditions fulfilled, an appreciable saving will result in the amount of fuel used per acre.

During the last year or two, when the consumption of kerosene for power purposes on Australian farms has expanded very rapidly, the system of supplying country centres in "bulk" has been successfully developed, and "Cross" kerosene is not now seen in many districts in the well-known cases and tins as formerly. The 40-gallon drum is gradually ousting the more expensive tins and cases; but, judging by its almost universal use, "Cross" continues to hold pride of place in most farming communities in Australia.

# General Notes.

### Grade Standards for Fruit.

Grade standards have been issued under the Fruit and Vegetables Acts for cavendish bananas, oranges and mandarins. The grade standards for cavendish bananas are the same as those previously issued with the addition that there is now included a grade called "special," which means sound fruit, free from blemish, and having a minimum length of 9 inches and a minimum circumference of 5 inches. Further, in the "choice" and "standard" varieties, a variation of a quarter of an inch in the minimum circumference will be allowed. The grade standards for oranges and mandarins practically remain the same, with the exception that mandarins 2 inches in diameter will be allowed.

### Staff Changes and Appointments.

Acting Sergeant L. Jorgensen, of Windorah, has been appointed Inspector of Brands as from 2nd March, 1929; and Constable H. Sternberg, of Monto, has been appointed Inspector of Slaughter-houses as from that date.

Messrs. J. P. Jackson and W. Onton, of Mary's Creek, via Gympie, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

The Inspector of Stock at Bowen has been appointed Government Representative on the Bowen Dingo Board, vice the Police Magistrate, Bowen, relieved of the duties.

Mr. W. D. Lewis has been seconded for duty as Temporary Inspector under the Diseases in Plants Acts until 30th June, 1929.

Messrs. J. Beck, Stanwell; H. R. Brake, Wowan; G. H. Bradley, Argoon; J. Bryant, Chowey; D. C. Pryce, Toogoolawah; F. A. Kajewski, Ma Ma Creek; and L. R. Macgregor, Director of Marketing, have been appointed members of the Cotton Board as from 19th February, 1929, to the 31st December, 1931.

The Inspector of Stock at Winton has been appointed Government representative on the Gregory Dingo Board, and Messrs. G. Morgan Reade, W. C. Quartermaine, G. A. Patterson, and R. J. Edwards have been elected members of that board.

The resignation of Mr. F. W. Haynes, Inspector, Agricultural Bank, Dalby, has been accepted as from 28th February, 1929, as tendered.

The resignation of Mr. G. A. Currie, Assistant Entomologist, Cotton Section, has been accepted as from 10th March, 1929, as tendered.

The Tully Cane Pest Board has been constituted as follows:—Millowners' representatives: Messrs. G. R. Blair and J. J. Cran; canegrowers' representatives: Messrs. J. D. Irving, W. Moran, and A. J. Winter. And the South Johnstone Cane Pest Board has been constituted as follows:—Millowners' representatives: Messrs. F. Gillan and C. J. Magee; canegrowers' representatives: Messrs. M. J. McNamee, C. E. Myers, and D. V. Woods.

Constable W. T. Barclay, of Turn-off Lagoons, has been also appointed Inspector of Slaughter-houses.

Mr. H. F. Damm, of Goomboorian, via Gympie, has been appointed Honorary Inspector under and for the purposes of the Diseases in Plants Acts.

The members—millowners' representatives, canegrowers' representatives, and chairmen—of the various Local Sugar Cane Prices Boards throughout Queensland have been appointed for the forthcoming sugar season.

The following appointments have been made in the Agricultural Bank, Brisbane:—Mr. T. R. Quinn, Sub-Accountant, to be Senior Clerk, Accounts; Mr. J. McL. Hendy, Clerk, to be Clerk, Securities; Mr. J. R. Laherty, Clerk, to be Clerk, Possessions; and Mr. V. G. Dunne, Clerk, to be Clerk, Correspondence.

Mr. M. Flanagan, Inspector of Slaughter-houses, Bundaberg, has been appointed Inspector of Stock.

Mr. J. P. Ward, Clerk, Agricultural Bank, has been appointed Acting Inspector, Agricultural Bank, for a period of six months.

Mr. F. W. Schafer, C.P.S., Port Douglas, has been appointed Chairman of the Mossman Local Sugar Cane Prices Board, vice Mr. T. R. Beck, transferred.

### Open Season for Goose and Duck in North Queensland.

The open season for goose and duck in North Queensland has been altered. The season will now be open on the 1st June and will close on the 31st October in each year.

### Open Season for Ducks.

An Order in Council has been approved under the Animals and Birds Acts, declaring that the season for ducks in Southern Queensland will open on the 6th May, 1929, instead of the 1st April as in the preceding year. This open season will extend to 31st August, 1929.

### Custard Apple Levy.

The custard apple levy regulations made under and for the purposes of the Fruit Marketing Organisation Acts in 1927 have again been extended to all custard apples marketed for the period from 1st March, 1929, to 28th February, 1930. This levy is at the rate of one half-penny per half-bushel case of custard apples marketed.

### Introduction of Seed Wheat into Queensland.

By Proclamation under the Diseases in Plants Acts it has been declared that the introduction into Queensland of plants or portions of plants of all and every variety of wheat intended for seed purposes is not permitted unless a permit in writing shall have been first issued in respect thereof by an inspector.

### Examination of Brands.

Regulations have been approved under the Diseases in Stock and Brands Acts, providing that an inspector may, for the purpose of identifying stock, clip or cause to be clipped or otherwise remove the hair from portions of any stock for the purpose of examining the brands upon such stock or for the purpose of ascertaining if there are any brands thereon.

### Honey Board.

By Order in Council under the Primary Producers' Organisation and Marketing Acts, a Honey Board has been constituted for a period of five years to control honey and beeswax produced in Queensland by persons owning not less than five hives of bees in movable frames. The board to control the commodities will consist of four annually elected representatives of growers and the Director of Marketing.

### The New Statesmanship.

"At present there is too much praise given to the safe men who, with a timidity which is often falsely called caution, cling to the old ways. The problems of human society demand a new type of statesmanship altogether, with the courage and integrity of the scientists in it, and unless the world comes under such leadership man may master the skies, but he will miserably fail to prove himself master of the earth."—Dr. Sidney Berry, in the "Yorkshire Observer."

### Buffalo Fly.

In view of the danger to be apprehended from an extension of the buffalo fly pest, an Order in Council has been issued declaring a special area as a protective measure to regulate the movement of cattle from and within the present infested or suspected areas in the extreme north-western portion of the State. Action has already been taken by the Government to close Westmoreland crossing place against the entry of stock from the Northern Territory into Queensland.

### Egg Board Referendum.

The question "Are you in favour of or against the extension of the duration of the Egg Board until the 31st day of December, 1933?" was submitted to 3,600 poultry growers owing fifty fowls and over who supplied their eggs to the Egg Board or its authorised agents has been decided. The result of the voting was:—

| | |
|---|---|
| For the continuance | 996 votes. |
| Against the continuance | 417 votes. |

Mr. Arthur Jones, of the Department of Agriculture and Stock, was the returning officer.

### Winter Roses.

"It has been observed that often the people who have the hardest life are the most cheerful. Patients in hospital, experiencing great pain; men and women, surrounded by all sorts of troubles at home and in their work; old people who have to be very careful of their health and their savings, and often haunted by some nameless fear—these are the people who are often most brave and very happy. What is the secret of it? There is no winter in a warm heart. There are roses in winter as well as summer."—The Rev. J. T. Hodgson, in the "North-Eastern Daily Gazette."

### Honey Production Returns.

A regulation has been issued under the Primary Producers' Organisation and Marketing Acts requiring all beekeepers to furnish to the Minister by not later than the 23rd April information regarding the quantity of honey produced by them during the fifteen months ending on the 31st March, 1929. At the same time Metropolitan commission agents are required to furnish a return for the same period regarding the quantity of honey received by the agent from beekeepers. Further, wholesale merchants are required to furnish a return showing the quantity of honey purchased by them during the fifteen months ending 31st March, 1929.

### Federal Bounties—The Case for Cotton.

Mr. F. M. Forde, M.H.R., in defending the cotton industry, has recently pointed out that, out of a total amount of £895,498 spent on bounties by the Commonwealth Government for the financial year 1927-28, only £81,453 was paid on seed cotton and £24,846 was paid on cotton yarn. The wine export bounty amounted to £482,483, and the other bounties were made up as follows:—Sulphur, £57,377 0s. 9d.; Papua and New Guinea, £194 8s. 10d.; canned fruit, £4,730 9s. 7d.; shale oil, £427 11s. 8d.; iron and steel products: wire netting £73,872 10s. 6d., fencing wire £104,485 7s. 10d., galvanised sheets £65,128 6s. 3d.; tractors, £140. Mr. Forde is now actively engaged in endeavouring to induce the Federal Government to give effective protection to the cotton industry before Parliament rises.

### Valedictory.

The officers of both the Cotton Section and the Division of Entomology and Plant Pathology of the Department of Agriculture and Stock gathered on Saturday morning, 9th March, to bid farewell to Mr. G. A. Currie, who has occupied the position of Assistant Cotton Entomologist for the past few years. Mr. Currie is leaving Brisbane for Canberra for the purpose of taking up an appointment as Entomologist in Charge of the Noxious Weed Investigations under the Council for Scientific and Industrial Research.

Mr. Veitch, Chief Entomologist, presented a pair of silver-backed brushes as a token of the esteem in which Mr. Currie is held by his fellow officers, and in some well-chosen words extended the best wishes of those present. Mr. Wells, Government Cotton Specialist, in seconding Mr. Veitch, spoke in high terms of Mr. Currie and his work. Mr. Currie suitably responded, and mentioned that he hoped that his leaving Brisbane would not sever his connection with the friends he had made in the Department.

### Youth's Opportunity.

"Learn to say 'No' to yourself in matters of pleasure.

"Start early at the bottom of the ladder.

"The men who 'live well,' but 'not too well,' get on best all over the world.

"The future may see lads going into a factory for two years, then to a university.

"Grumbling should be kept to oneself.

"If a young man can manage to take as much interest in the business he has entered as he does in, say, football, cricket, or motor-cars, there is not much fear of his troubling about whether the dole will be increased or diminished.

"No man will be a success in a calling he dislikes.

"The next crop of millionaires are licking our stamps now."—From a symposium on the subject of success in business, compiled by Mr. R. B. Dunwoody, Secretary of the Association of British Chambers of Commerce.

### Egg Board.

By Order in Council under the Primary Producers' Organisation and Marketing Acts the constitution of the Egg Board has been extended until the 31st December, 1933. This Board deals with the owners of fifty fowls and over.

### Citrus Levy Regulations.

The Citrus Levy Regulations under the Fruit Marketing Organisation Acts have been extended to all citrus fruits marketed for the year ending 28th February, 1930. The levy will be at the rate of 1d. per bushel case, ½d. per half bushel case, and 4s. per ton, payable on all citrus sent forward to any firm or person carrying on the business of a fruit-canner, fruit-preserver, jam or pulp manufacturer, or juice extractor.

### New Sanctuaries for Useful Animals and Birds.

Fisherman Islands, in the estuary of the Brisbane River, have been declared a sanctuary for animals and birds.

The boundaries of a previously constituted sanctuary in the Hughenden district have been extended to include portions of Chudleigh Park and Pine Tree Holdings.

### Banana Board Poll.

Following is the result of a poll to decide the question of the formation of a Banana Board:—

| | |
|---|---|
| For the setting up of a Banana Board .. .. .. | 854 votes. |
| Against the setting up of a Banana Board .. .. .. | 1,121 „ |

The proposal therefore lapsed.

### A Remedy for Slippery Concrete Floors.

To overcome the risk of cattle slipping on concrete floors sprinkle some ordinary ground lime (unburnt) over the floor daily after cleaning.

This treatment checks the formation of a slippery surface film that arises from the frequent hosing of the floors. It also acts as a slight disinfectant and deodorant and gives a clean white floor.

### Egg Board Election.

The result of the election of the No. 5 District (Darling Downs) representatives was:—

| | |
|---|---|
| Francis Bell Common (Toowoomba) .. .. | 185 votes |
| William Dearling (Oakey) .. .. .. .. | 113 votes |

The members of the new Board will therefore be Messrs. R. B. Corbett, M. H. Campbell, A. McLauchlan, T. Hallick, F. B. Common, and L. R. Macgregor (Director of Marketing). The new members are Messrs. Hallick and Common.

### Strawberry Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts constituting a Strawberry Board for a period of one year. The Board to deal with the commodity will consist of three elected representatives of growers and the Director of Marketing, such members to hold office till the date of expiry of the term of the Board. The whole of the commodity will be divested from the growers and become vested in and be the property of the Board as owners.

The following nominations have been received by the Department of Agriculture and Stock for the election of the three growers' representatives on the newly constituted Strawberry Board:—

S. J. Howe, Woombye.

H. T. Mills, Wynnum West.

G. E. Wort, Cleveland.

As only the required number has been nominated these growers, together with Mr. L. R. Macgregor, Director of Marketing, will therefore be appointed to hold office until the 27th March, 1930, the date of the expiry of the term of the Board.

### Nature and Statesmanship.

"Cutting deep into the problems of modern life, are the the lessons of Nature—the nemesis of parasitism, for it spells degeneracy; the dangers of sluggish existence, when the environment is so apt to master the organism; and the risks that are run whenever Nature's sifting ceases, and is not replaced by some higher form of selection. A society that dispenses with sifting is working out its own doom. Other things equal, one would always trust the judgment of a country-bred statesman more than that of one wholly urban, for the man who is at home in the country has the deep impressions of growing and developing which cannot be safely dispensed with by those who would legislate for human life. Especially in a necessarily mechanical age is it folly to allow our children to grow up out of touch with living nature. This is not a question of educational opinion. It is a matter of life and death. It was said long ago that 'Man does not live by bread alone.' There is a complementary warning, 'Organisms cannot be nurtured on mechanisms only.'"
—Professor J. Arthur Thomson.

### Man Must have a Focus.

"A philosophy of life is of immense practical value. A man has to find a focus in his life; some permanent abiding place in this world of change. He may not go far, but he will go far enough to put into some shape what he thinks to be permanent. Again, every intelligent man tries to give some sort of satisfaction to his reflective interest in the world. A philosophy of life supplies him with a standard of judgment. It gives him a sense of proportion and perspective—sometimes a sense of humour, which is the same thing—and if a man has both a sense of humour and a philosophy of life he is a happy man. A philosophy of life enables a man to link up the past, the present, and the future, to adjust himself to the necessities of circumstances, and to reconcile himself to the system of the world in which he finds himself. If there is anything that will give a man freshness from day to day it is working on a principle which is not for the moment, but which has an aspect of eternity in it."—Dr. J. B. Baillie, Vice-Chancellor of Leeds University.

### The Dingo—A Few Hints on Poisoning.

In the February issue advice was given on the trapping of the dingo, and the same general principles as mentioned in connection with trapping can be followed in regard to the placing of baits, trails, and decoys.

Butter fat, fish, liver, kidney, pork, meat, and suet are all excellent baits. The first two are rolled into balls, the remainder cut into 1-in. cubes. Strychnine is probably the best poison to use, and 3 grains (as much as would fit on a threepenny piece) is sufficient. This is inserted into the middle of the ball or cube through a small knife slit. If practicable, do not touch the bait with the naked hands. If this is done, scorch it over a flame to eliminate any human odour.

One American bulletin, in reference to coyotes, states that a carcase should not be poisoned, but that coyotes should be allowed to eat some of it and the poison baits should be placed all round it, 20 to 30 ft. away. The same bulletin suggests the placing of strychnine in small gelatine capsules in the bait to prevent as far as possible its nauseating taste. In Western Australia the following plan was adopted. Sheep were placed at night in a small dog-proof yard in the middle of the paddock. From this yard radiating trails were made by dragging a carcase or a fish, and round the fence of the yard poison baits and traps were set.

Carcases of dead lambs may be poisoned by inserting 3 grains of strychnine into a muscular portion through a knife slit. When baits are placed on the ground always have them as fresh as possible, and covered with a few dried leaves or a piece of bark. Another method is to wrap the bait in a piece of newspaper. The dingo, being essentially an inquisitive animal, will unroll the paper and devour the bait. This trick may not work for long, the animals becoming very suspicious of the paper after a time.

Although, as a general rule, the best work in connection with the destruction of dingoes can be done during the spring and summer, when the young and inexperienced pups are about, there is an exception to the rule, and it is in regard to poisoning, which is best carried out in the cooler months of the year.

*A Warning.*—Strychnine is a powerful and deadly poison to man and animals, and should always be regarded as such. Label all containers with a poison label, and be careful to wash the hands thoroughly after using, and never allow it to be placed near any food. Domestic dogs should be chained up and neighbours notified of intention to lay poison. Notices should be erected on land and placed in local newspapers that poison baits will be laid.

**Ideals, Talk, but what of Action?**

"The too talkative exponents of the 'higher life' in commerce have only themselves to thank when satirists grow merry (or ferocious) over the spectacle of the business man as evangelist," says the "Manchester Guardian." "After all, a virtue that was so very well advertised would not be tolerated in other walks of life; we should soon grow tired of a doctor or lawyer who was always dwelling on his own altruistic motives, and there seems to be no reason why a business man should be allowed to sing his own praises so insistently. Service is a very fine ideal, but it is most convincing when it is least self-conscious."

**Life.**

"Life gets very much of its thrill and interest from the fact that it is always a going-forth into the unknown. What will come to us through the months of this year upon which we are just entering not one of us can say, but it is that very limitation of our knowledge that helps to keep the whole great enterprise of living full of zest and eagerness and expectation. Whether we will it or not, life must always be more or less of an adventuring, a trying of new paths and a meeting of unexpected difficulties and testings and opportunities. This is not something to be complained against; it is something to be rejoiced in—something, indeed, to be lived up to, to the full. Much more than many of us do, we should think of life as a great adventure, and thus keep in it the zest of great hopes and eager anticipations. There is a great truth in that thought; a truth, however, that many of us seem to miss, and just because we miss it our lives have lacked so much the zest and keenness and the interest that they ought to have."—"The New Outlook."

**Motor Headlights—Dimming Condemned.**

The question as to whether a motorist should switch off his headlights upon approaching a vehicle travelling in the opposite direction has been discussed from all angles, but has been revived by what is thought to be the first case in England in which a motorist has been censured by a coroner for dimming his lights, and so causing a fatal accident. Fortunately the practice is dying out in Australia, although a number of drivers still consider it an act of courtesy to switch off their lights when approaching another car, particularly on country roads. After years of driving in the country, the writer is convinced that, generally speaking, it is a bad practice to switch the headlights on and off on meeting approaching traffic, but he is also fully convinced that there should be more rigid control of glaring headlights. Although the headlights are supposed to throw their beam of light on to the roadway not more than 60 yards in front of the car, many of them are cocked up so that the beam does not strike the road at all, but is directed right into the eyes of the drivers of approaching cars. It is the writer's practice, when approaching glaring headlights, to keep his eye on the road (excluding as much of the glare as possible), and to slow down until the "offending" car has passed.

Commenting upon the occurrence in which the coroner in England censured the driver for dimming his headlights, "The Motor" says that two men were pushing a barrow across Blackheath, and the car crashed into them from the rear, resulting in the death of one of the men. The motorist said that as he was proceeding across Blackheath another car coming in the opposite direction with headlights on dazzled him so much that he switched his own off, thinking that the other motorist would do the same. The other motorist did not do so, however, and in turning into the near side the crash occurred.

The jury returned a verdict of accidental death, but said that the accident was due to the bad driving of the defendant.

The coroner, agreeing with the jury, said that he did not think the defendant was fit to drive a car. It was not right to shut off his headlights and to blind himself so that he could not see the barrow. He considered it very bad and wicked driving —gross negligence that might have influenced the jury to return a verdict of manslaughter.

The case (says "The Motor") is one that undoubtedly clearly reveals in a tragic manner the danger of switching off, but the coroner's strictures were rather severe. There are evidently some motorists that still consider cutting out the headlights an act of courtesy, and although the risks of doing so are enormous it does not necessarily follow that a man that does it is not fit to drive a motor car.

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### THE MANAGEMENT OF BABY.

On the treatment and training which an infant receives in the first twelve weeks of life depends greatly its progress during the ensuing twelve months. The opinion is frequently expressed that the new-born baby is too young to be trained; this is a mistake. Even very young babies quickly acquire habits, and it is important that they should be of the right kind.

To delay training until he is a few months old may, and probably will, result in giving mother or nurse a great deal of trouble, and the baby much unnecessary distress. So begin as you mean to go on.

#### The First Bath.

The first bath should be performed quickly. The new-born infant is not yet used to his new surroundings, and is very easily chilled. For this reason oil and bath him as quickly as you can; dress him, and see that he is warm and comfortable. He will probably be very drowsy and inclined to sleep for some hours. Newly-born infants should sleep more than three parts of their time, and for the first few days practically all the time they are not occupied with bathing and feeding.

#### The Baby's Bassinette.

From birth baby should have his own cot; he should never sleep with his mother. Not only is it healthier for him to sleep alone, but he sleeps better so. Some people think that the baby requires to sleep with his mother for warmth. This is a mistake. A healthy baby will, for most of the year, keep comfortably warm without any external heat other than that supplied by the bedclothes on his cot. For the coldest months, if he is inclined to be chilly, his bed can be warmed with a hot water bag or bottle, carefully placed with the stopper or cork inclined downward, so that there is no possibility of baby being burnt, even if the stopper or cork should accidentally come out. He should be accustomed from birth to sleep without a light. People who have had much experience with young babies notice that their sleep is more likely to be sound and undisturbed if there is no light in the room.

#### Feeding the Infant Australian.

Now for the feeding of the new baby. This is a most important matter, and probably more mistakes are made on this than any other point in the management of infants.

Most babies when born know how to suck. It is seldom we find one who cannot do so. This is because for long ages past babies have been fed at their mother's breasts, and at birth the sucking instinct is present. This instinct must be developed, but care taken that it is done on the right lines. It must not be either underdeveloped or overdeveloped. If baby, who very often in these first days of life is very sleepy indeed, is allowed to sleep almost undisturbed, he may at the end of a day or two be very unwilling to work for his living. For that is what sucking is to a baby, and there is no more difficult child to manage than the one who has not been trained to suck properly. Feeding him from a feeding bottle, with the hole in the teat so large that the fluid pours down his throat without effort on his part, will also result in disinclination to suck.

The instinct can be over stimulated by putting baby too frequently to the breast, or by leaving him there for too long a time. Also by giving him a dummy to suck constantly.

Vigorous sucking is necessary for his health, but it should be done regularly and at proper feeding time only. In the early months of life it forms a very important part of baby's daily exercise, for not only does it develop jaws and mouth but it improves the circulation of the whole body.

There is another reason why baby should be trained to correct feeding habits early. We all know that the mother's full milk supply does not come in until the end of the second or the beginning of the third day after baby's birth. But before the milk comes in there is a little creamy-looking fluid in the breasts. This the baby should have, for although there is very little it has high food value, and at this time no other food can take its place. In addition, the mother's health also is benefited, and she makes a quicker recovery if baby is put regularly to the breast at this time.

Put baby to the breast within about six hours of birth—as soon as the mother has rested—leaving him only about two minutes at each breast. See that he is actually sucking and not dozing. It will be sufficient to do this once every six hours for the first day. On the second day leave him three or four minutes at each breast, and feed him every four hours. On the third day, when the milk supply is usually established, put him to the breast every three hours, and leave him about fifteen minutes. The average baby takes from fifteen to twenty minutes to feed. No baby should be left at the breast for longer than thirty minutes, and it is only delicate babies or those who suck feebly who should require so long.

Alternate the commencing breast—i.e., if you begin by giving the baby the right breast for his first feed, commence with the left for the second, the right again for the third, and so on.

### The Value of Early Training.

Big strong babies generally do well if fed every four hours—that is, five feeds daily—from the third day. Others are better on three hourly feeding (six feeds daily) until they are about three months old. After that time four hourly feeding suits most infants, but never jump suddenly from three to four hourly feeding. Increase the intervals by a quarter of an hour every second or third day until a four hourly interval is reached. This can be done without baby being aware that any change is being made. Give no night feeds from birth. This is most important. If this is done from the start of life baby learns to take all that he needs in the day time. This allows him and his mother to get the regular uninterrupted night's sleep which both require. A baby trained from birth to have no night feeds takes during the day all he requires to satisfy his hunger, and for his growth and development.

If fed in the day only he obtains just as much as if he were being fed both day and night. For example, careful weighing of children before and after feeding has shown that a child having, say, 30 oz. of food in the twenty-four hours, and given six feeds a day, takes 5 oz. at each feed, while if he is fed ten times a day he takes 3 oz. at each feed, thus obtaining exactly the same quality of food in the twenty-four hours.

### Regular Habits.

But this training must start at birth. A baby accustomed to being fed night and day will protest vigorously if his mother suddenly lengthens his feeding intervals. He has been trained to frequent feedings, so takes only sufficient to satisfy his hunger for that period. But when started from birth on regular three or four hourly feeds, with no night feeds, he never expects anything else. So keep absolutely to regular feeding times; make no exceptions. To do so one day will almost certainly result in the baby demanding the same concession the next day. Never hesitate to wake baby during the day when feeding time comes round. Very soon he will learn to wake himself at the right time. If he is allowed to sleep over his feeding time during the day, he cannot be expected to sleep all night. He will not have had his full supply of food, so will be hungry and restless.

One more very important point before closing. Mention has already been made of the fact that the mother's milk does not come in until the second or third day. As a result, many people think it their duty to give baby artificial food during this time. This is a great mistake, which can lead to much trouble, and in many cases has been responsible for the unnecessary weaning of the baby.

### Important Points to Remember.

If baby required food during the first two days of his life Nature would supply it. The very fact that it is not there proves it to be unnecessary. As previously mentioned, baby needs the little fluid there is in the mother's breasts at that time,

and should be put regularly to the breast to obtain it. Beyond this nothing but plain boiled water should be given. Babies who are fed on sweetened water or condensed milk as their first food not infrequently refuse to take their natural food later. The reason is simple. Cane sugar, which sweetens both sugar and water and condensed milk, is very sweet. Mother's milk contains a different sugar, called sugar of milk; this is only faintly sweet. Babies like sweet things, and show their preference by refusing to take their proper food.

Important points to remmber in feeding baby are—Commence training at birth; feed regularly; give no night feeds; wake baby when necessary during the day; make no exceptions.

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## THE COUNTRY GIRL'S OPPORTUNITIES.

What opportunities has the country girl for broadening her mind? Doesn't that to a great extent depend on the individual girl?

It is certain that, fundamentally, some one thing more than any other appeals to each one of us. It may be music, literature, art, nature study, appearance, conversation—what you please, but it is there. For the country girl some "bents" are more difficult to satisfy than others, but none is impossible.

Thin, eager persons are often obsessed by one idea that they will satisfy, come what may; their more weighty sisters of both town and country are not so eager—interest in all round them does not come to them spontaneously. They must cultivate an interest; they must—it sounds unkind, but it is true—they must thin the body and fatten the wit.

Be keen on something, anything; almost everyone has a love of reading; it begins with nursery rhymes and fairy stories; later it may develop into a desire for Deadwood Dicks—or Ethel M. Dell; perhaps from her to Zane Grey, and then to Scott's novels and ballads.

Every book, however trivial, has in it something to digest. I will admit some are calculated to give one a severe attack of dyspepsia before being assimilated; however, one can lead up to this stronger meat from the candy-and-cream-cake variety.

Motor-cars and wireless are perhaps the greatest factors in the evolution of the country girl. Both eliminate space and bring the big things of the world nearer. Many persons that cannot afford a car can afford a good wireless set, and with it much of the news and beauty that is in the world is brought right into the home.

Supposing the farm girl wants to improve her appearance, to dress better; for the reading she can have fashion articles by the world's greatest authorities; while from the advertising section she sees where to go and what to buy for her various needs.

Perhaps the happiest girls in the bush are those with a love of gardening and of wild things; and not only wild things, for they have the opportunity to keep their own horses and dogs.

Only when one has always loved the "first friend" and has no longer anywhere to keep him, does one realise how terribly empty a place he leaves, a longing that no human companionship can supply.

All Australian bush creatures are queer and thrilling. I have found baby porcupines, soft and pink and spineless, caught turtles from the river no bigger than pennies, seen bright coloured tree-snakes, and tried to track the wily platypus to his lair—and failed!

Kangaroo joeys, 'possums, &c., are more commonplace, but are very sweet and alluring babies, with soft fur and big frightened eyes.

The birds are a never-ending pageant. There are always newcomers, migrants from far-away lands; and in November nests full of queer little fledglings, bold and hungry, entirely selfish and very noisy.

Most country towns—even the bush towns—have their picture shows. Usually one reel illustrates some constructive subject that the world is interested in, and the others if not always first-class as pictures go are anyway spirit trips to other times, other places and people—travel of a sort to those who are moored in one place which, however loved, cannot quite kill the longing for adventure and the wanderlust so strong in some of us.

I have purposely left until the last the most unusual and yet most obvious pleasure for everyone; the use of that gift which places us so far above even the aristocracy of the animal world—speech. Speech, so often abused by rehearsing tittle-tattle, is still the medium of expression from one human soul to another.

The hero of one of William Morris's books describes someone very dear to him in these words: "He is my speech-friend." Most men have one particular pal in whose company they find perfect happiness, just having a yarn. He is the speech-friend.

In "The Patsy" now playing in Sydney, Patsy regrets her inability to talk wittily, so that, when she sees a book advertised as containing witty remarks for every occasion, she buys it, learns the bon mots by heart, and tries them on her distracted family, who think she has gone mad!

This is rather too drastic a way to become a conversationalist, but when all is said and done it is this gift alone that enables us to think and feel for and with others that gives sympathy and understanding to those we love. I quote from Mr. Hilaire Belloc:—

"From quiet homes and first beginnings,
Out to the undiscovered ends,
There's nothing worth the wear of winning
But laughter and the love of friends."

—"Gunyan," in "The Farmer and Settler."

## KITCHEN GARDEN.

Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleaned, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, khol-rabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

## FLOWER GARDEN.

Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pentstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia bulbs should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

## THE BOY, THE FARM, AND HIS OPPORTUNITY.

Apart from the fact that the prosperity of the Dominion is dependent upon the successful cultivation of the land, from which 90 per cent. of its exportable produce is derived, it is plain that the greater the number of people who are settled in country pursuits the larger must be the demand for the output of the secondary industries and the more extensive the opportunities for the employment of young people in these industries. Yet it is not by telling them this that the bias towards work in the towns on the part of the young will be overcome. It has to be brought home to their minds that, after all, their material interests are more likely to be served by their turning their attention to rural pursuits than by their remaining in the towns and hanging about the streets in the hope of their securing a place in an office or a shop or a factory that may ultimately not lead them very far. It has been pointed out that the proportion of persons engaged in the rural industries who are their own masters is several times greater than it is in any of the secondary industries or in commerce, and, consequently, that the youth who is induced to accept employment on the land has a better chance of attaining independence than he has in any calling outside the learned professions."—"Otago Daily Times" (N.Z.).

# Farm Notes for May.

Field.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Clover land, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginnery should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

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# Orchard Notes for May.

## THE COASTAL DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become speckled or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2¼ to 2½ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or speeking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of speeky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are

given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—*not vines*, as the later vines are pruned in the season, the better in the Granite Belt district, as late pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

*Photo.: Jean Easton.*]

Plate 1.

The Macpherson Range is an Imposing Background to this Stretch of Rich Pasture Land on Coochin.

*Photo.: Jean Easton.*]

Plate 92.

A Favourite Spot, when the day's work is done, the Coochin Swimming Hole.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | April, 1929. | | May, 1929. | | MOONRISE. April. 1929. | May, 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | p.m. |
| 1 | 6.4 | 5.48 | 6.21 | 5.17 | 10.25 | 10.54 |
| 2 | 6.5 | 5.47 | 6.21 | 5.16 | 11.16 | 11.51 |
| 3 | 6.5 | 5.46 | 6 22 | 5 15 | 0.0 | |
| | | | | | a.m. | a.m. |
| 4 | 6.6 | 5.45 | 6.23 | 5.14 | 12.11 | 12.49 |
| 5 | 6.7 | 5.43 | 6.24 | 5.14 | 1.6 | 1.48 |
| 6 | 6.7 | 5.42 | 6.24 | 5.13 | 2.5 | 2.47 |
| 7 | 6.8 | 5.41 | 6.25 | 5.13 | 3.5 | 3.48 |
| 8 | 6.8 | 5.39 | 6.25 | 5.12 | 4.4 | 4.50 |
| 9 | 6.9 | 5.38 | 6.26 | 5.11 | 5.5 | 5.55 |
| 10 | 6.9 | 5.37 | 6.26 | 5.11 | 6.6 | 7.8 |
| 11 | 6.10 | 5.36 | 6.27 | 5.10 | 7.10 | 8.17 |
| 12 | 6.10 | 5.35 | 6 27 | 5.10 | 8.16 | 9.27 |
| 13 | 6.11 | 5.34 | 6.28 | 5.9 | 9.25 | 10.33 |
| 14 | 6.11 | 5.33 | 6.28 | 5.9 | 10.34 | 11.31 |
| | | | | | | p.m. |
| 15 | 6.12 | 5.32 | 6 29 | 5.8 | 11.40 | 12.23 |
| | | | | | p.m. | |
| 16 | 6.12 | 5.30 | 6.29 | 5.7 | 12.40 | 1.3 |
| 17 | 6.13 | 5.29 | 6 30 | 5.7 | 1.35 | 1.40 |
| 18 | 6.13 | 5.28 | 6 30 | 5.6 | 2.22 | 2.12 |
| 19 | 6.14 | 5.27 | 6 31 | 5.6 | 3.2 | 2.42 |
| 20 | 6.14 | 5.26 | 6 32 | 5.5 | 3.38 | 3.12 |
| 21 | 6.15 | 5.25 | 6.33 | 5.5 | 4.9 | 3.43 |
| 22 | 6.15 | 5.24 | 6 34 | 5.4 | 4.39 | 4.16 |
| 23 | 6.16 | 5.23 | 6.34 | 5.4 | 5.11 | 4.52 |
| 24 | 6.16 | 5.22 | 6.35 | 5.3 | 5.40 | 5.30 |
| 25 | 6.17 | 5.21 | 6.35 | 5.3 | 6.16 | 6.14 |
| 26 | 6.17 | 5.20 | 6 36 | 5.2 | 6.53 | 7.3 |
| 27 | 6.18 | 5.19 | 6.36 | 5.2 | 7.35 | 7.54 |
| 28 | 6.18 | 5.18 | 6.37 | 5.1 | 8.23 | 8.48 |
| 29 | 6.19 | 5.18 | 6.37 | 5.1 | 9.12 | 9.42 |
| 30 | 6.19 | 5.17 | 6.38 | 5.0 | 10.5 | 10.40 |
| 31 | | | 6.38 | 5.0 | | 11.36 |

## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|---|---|---|---|
| 2 Apr. | ☽ | Last Quarter | 5 29 p.m. |
| 10 „ | ● | New Moon | 6 32 a.m. |
| 17 „ | ☾ | First Quarter | 12 9 a.m. |
| 24 „ | ○ | Full Moon | 7 37 a.m. |

Apogee, 1st April, at 11 12 a.m.
Perigee, 13th April, at 7 30 a.m.
Apogee, 29th April, at 5 0 a.m.

Mercury will be passing from the west to the east side of the Sun on the 17th, only very slightly above its upper limb. It will, of course, be entirely invisible in that position, but will not set till about 45 minutes after the Sun on the 30th.

On the 20th, Venus will be passing the Sun on the earth-side of its orbit, but nearly 6 degrees below it at midday; it will then have its dark side to the earth, but will come into view as a morning star a few days later, and will be seen about an hour before sunrise near the eastern horizon at the end of the month.

The Moon will be passing about 5 degrees south of Saturn soon after midnight on the 28th.

Mars will be, apparently, amongst the stars of Gemini during this month; Jupiter in Aries; Saturn, almost stationary, in Sagittarius; Uranus moving very slowly eastward in Pisces; and Neptune very near Regulus in Leo.

The Southern Cross on the 1st April will be at position IX, on an imaginary clock face in the sky, 30 degrees east of the south celestial pole at about 6 p.m., and at position III., 30 degrees west of the pole about 6 a.m. It will, therefore, be upright and at its highest position (58 degrees above the southern horizon at Warwick) at midnight. This imaginary clock face, having the south celestial pole as its centre, with a diameter of 68 degrees, will afford all the varying positions of the Cross throughout the year and during every twenty-four hours. The pole will always be the same number of degrees above the southern horizon that the observer is from the equator.

| | | | |
|---|---|---|---|
| 2 May | ☽ | Last Quarter | 11 25 a.m. |
| 9 „ | ● | New Moon | 4 7 p.m. |
| 16 „ | ☾ | First Quarter | 6 56 a.m. |
| 23 „ | ○ | Full Moon | 8 49 p.m. |

Perigee, 11th May, at 6.6 a.m.
Apogee, 26th May, at 5·54 p.m.

The conjunction of the Moon and Venus on the 7th will take place too nearly in the direction of the Sun to be observable.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. 1 MAY, 1929. PART 5.

## Event and Comment.

### Agricultural and Pastoral Prospects.

OWING to the favourable weather conditions which prevailed during the past quarter throughout those portions of the State where dairying is carried on, the outlook of that industry is very bright. Native pasturage and introduced grasses have made vigorous growth and, in localities where early rain fell, grasses have matured and seeded and late rain has promoted a fresh growth so that the pastures are in an excellent condition for the autumn and winter. Heavy cuttings of lucerne have been obtained, and large quantities have been conserved as hay. Owing to the heavy crops of maize, sorghums, and millets, much of this fodder is available for conservation, and advantage of this has been taken in some districts. The production of butter for the month of February (9,440,200 lb.) constituted a record, exceeding that of January, 1928 (9,293,368 lb.), which was the former peak month in production, by 146,832 lb., while the amount of cheese manufactured in January and February of this year totalled 2,951,667 lb. Dairy stock are in excellent condition and should winter well, as there is every indication of ample supplies of green fodder being available to supplement the natural pasturage. It is expected that the production for the ensuing three months will be above the average for the corresponding period of past years.

## The Sugar Crop.

THE first quarter of 1929 was marked by continuous heavy rains in the sugar areas north of Mackay. Exceptionally heavy rains were experienced north of Townsville, and over 100 inches were recorded at the South Johnstone Station, where the crops are reported as being well advanced. The Burdekin area is at present looking exceptionally well, and good rains have precluded the necessity for irrigation. The Bundaberg district received good rains in February, and the crops responded well to the succeeding hot weather. It is rather early yet to give an estimate of the sugar production for the coming season, but general indications are that it should equal the crushing of 1928.

## Promise of Good Wheat Crop.

THE widely distributed rainfall, accompanied by other favourable conditions, has been responsible for the present satisfactory outlook for the agriculturist in the Southern division of Queensland, which includes those areas from the Tweed to the Burnett. Owing to the prolific growth of weeds the amount of work involved in the preparation of land for wheatgrowing has been heavy. This, however, should show its effect in the resultant crop and ensure sufficient soil moisture to enable sowing to be carried out expeditiously, and also for the maintenance of the crop during the greater period of its growth. The wheat sown for fodder purposes is well above ground, increased areas of Cleveland and Currawa varieties, which are useful for grazing-off purposes, having been sown in the Pittsworth and surrounding districts. In the Central district, where a very favourable germination is expected, sowing will probably be carried out at an earlier date than is usual on account of conditions of temperature and soil being so favourable.

## Maize Ready for Harvesting.

THE maize crop, which in many instances is practically ready for harvesting, will be a heavy one, and provided that early frosts are not experienced on the Downs, the crop from that portion of the State should compare favourably with that of any other single season.

## Cotton Being Harvested.

THE harvesting of the cotton crop is now in full swing, and good quality cotton is coming forward to both the Rockhampton and Brisbane ginneries, particularly the former. The picking should cease about the end of July.

## Winter Fodders.

REPORTS indicate that considerable areas of winter-growing fodders have been sown, and that in many instances oats sown for grazing-off purposes are now 6 to 9 inches in height. It is anticipated that probably quite a reasonable area of canary seed will be sown for winter fodder, and, if climatic conditions continue favourable, portion of this may later be harvested for grain.

## Small Crops.

THE present crop of peanuts gives every indication of being a heavy one, and record yields have been quoted in a few instances. It is anticipated that a considerable increase in the area under peanuts will take place during the present year.

The season has been very favourable to the growth of broom millet in the Central districts, and excellent returns are being secured, while the prices received from the parcels already marketed are very satisfactory.

With the abundance of grass and the very favourable conditions at present existing for the growing of winter green feed, the outlook for the approaching winter is good. With every prospect for a good wheat crop and a satisfactory maize crop awaiting harvesting, optimism is quite justified.

## Fruitgrowing.

IN most districts the outlook of the fruitgrowing industry is satisfactory. Bananas continue to do well along the North Coast, and there has been a fair extension in the banana areas in that portion of the State. Excellent bananas are also being produced south of Gympie on the recently-planted lands. In the Central district, particularly in the principal producting area, Byfield, the citrus crop is quite up to the average, and prospects are decidedly encouraging. In the Wide Bay district the quality of the citrus crops is good, and the fruit now being marketed is realising satisfactory prices. The tomato lands are being added to in the Bowen-Townsville area, while Mackay is giving more attention to tomatoes and other small crops.

## Graziers' Prospects Bright.

CONSEQUENT upon the advantageous rains and the excellent condition of the herbage generally throughout the stock districts of the State, the outlook for the present quarter is very encouraging. Large numbers of cattle are being travelled to the meatworks, and Southern buyers have been very busy purchasing fat stock in the various districts. The cattle generally throughout the State are in good condition. With the exception of isolated cases of pleuro-pneumonia there have been few outbreaks of disease of any moment. Shearing has commenced in most sheep areas, and from all appearances the outlook for the grazier during the current quarter is bright.

## Anzac.

ANZAC Day will remain for all time a fixture in the Australian calendar, and as the years pass the event that it marks is becoming less of a memory and more of a great and glowing tradition. The anniversary of the Epic of Gallipoli was commemorated fitly, amply, and reverently on 25th April in every town and hamlet throughout the Commonwealth; and also in those far countries where, with their comrades of New Zealand, Great Britain, and France, the Australian soldier won lasting fame. It was not the "glory" of war that was extolled, but the service and the sacrifice and all those things that exalt the souls of men in hours of crisis, that the Nation recalled with glowing pride. Those men of our race who, when human liberty was in the balance and the toesin sounded went forth to fight and did not come home—those men who, in placing on the altar of their country's freedom their great gift of youth and life, became in a moment—

> The living theme of boys unborn for countless centuries,
> Peers of the noblest souls whom God has fired,
> Part of the amplest feat of history—

were remembered, and will be remembered, "while the light lasts, and in the darkness we shall not forget."

# Bureau of Sugar Experiment Stations.

## CANE PESTS AND DISEASES.

*The Bureau of Sugar Experiment Stations has received the following Plant Pathology notes (5th April, 1929) from the Division of Pathology attached to the Bureau:—*

For some months the staff of the Division of Pathology has been chiefly engaged in making field surveys in various districts, with the object of determining the best sources of seed cane for the spring planting this year. The area which can be surveyed in this manner is naturally limited on account of the small staff available at present for the work. When such surveys as we are able to undertake are completed, the Bureau will issue lists containing the names of those growers who have cane suitable for seed. Growers who purchase seed from farms mentioned in the lists are reminded that, wherever possible, they should also make a personal selection of the seed they have ordered. It is quite reasonable to expect that occasionally a field will become infected with disease between the time of inspection and the time of cutting the cane for seed. Also, the Bureau officers cannot inspect every single stool of cane in the field, and in the case of Mosaic, for example, when only two or three stools per acre are diseased, it is quite possible that these stools might be missed altogether.

### Lower Burdekin.

Downy Mildew or Leaf Stripe is probably the major disease of the Lower Burdekin, on account of the fact that it is responsible for the gradual disappearance of B.208 from the canefields of that area. B.208, when free from disease, produces such remarkable yields of sugar per acre that every effort should be made to save this cane. We think that it is possible to control Downy Mildew in the Burdekin area, where the winter months are so very dry and where practically no ratoons are grown. In attempting control there are two points to be observed:—

(1) Rigid selection of the seed cane, and

(2) The uprooting of any diseased plants as soon as they appear, that is, during the dry winter months.

With reference to seed selection, any cane should be rejected as seed cane if it is within 200 yards of even a single diseased cane. Mr. George Wilson, Assistant Pathologist, has recently spent three months in this district, making a comprehensive survey, and it is expected that his services will be available to the farmers of the Burdekin, for the purposes of seed selection, during April and May.

### Farleigh.

A survey of the Farleigh area is nearing completion, and has been carried out by Mr. E. J. F. Wood, Assistant Pathologist. The chief problem in this district is to reduce the amount of Mosaic disease, and a list of farms which are practically free from Mosaic and other major diseases will be published in due course. Farmers who should on no account plant their own seed, will be notified privately. Mr. Wood will be stationed in the Mackay district for some time, and will be prepared to advise farmers on proposed sources of seed. Requests for a visit from Mr. Wood should be addressed to the Sugar Experiment Station, Mackay.

### Bauple.

Mosaic has also been a serious problem in the Bauple area, and with the object of assisting the growers to combat this disease, by planting disease-free cane, Mr. N. L. Kelly, Assistant Pathologist, is now making a survey of the district. A list of approved farms will subsequently be published in the usual manner.

Mosaic is the most widespread of all serious diseases of sugar-cane, but in all parts of the world it has been shown that complete control may be obtained by the planting of selected seed, the uprooting of any diseased plants which may appear later, and clean cultivation. Crops such as maize and sorghums should not be grown near cane as they harbour the insect which spreads the disease. Most growers have no doubt read of the great decline of the Louisiana sugar industry, brought about largely by Mosaic disease. At the time of its recognition the disease had become too widespread to be controlled by seed selection. In 1925-26 practically the whole crop

was 100 per cent. infected, and production had fallen to about one-fifth the maximum figure. The situation required drastic measures, and a technologist with very wide powers was appointed. Under his direction a complete change-over is taking place to varieties which are highly resistant to Mosaic, and the result is that in two years the production has been more than doubled. The new Mosaic-resistant varieties which are now being grown are the Java canes P.O.J. 234, P.O.J. 36, and P.O.J. 213. These varieties were introduced into Australia, but have not shown sufficient promise under our conditions to warrant propagation.

**North of Townsville.**

Top Rot disease has been more common north of Townsville this year. At present our knowledge of this disease is not very extensive, and it is hoped that next year it will be possible for one pathologist to devote full time to the investigation of cause, transmission, and control. Observations on Top Rot in Queensland, and on the very similar Red Stripe in Hawaii, suggest that the most important factor in the control of the disease is the stage of growth of the cane at the commencement of the rainy season. That is to say, a vigorous, well-grown crop is likely to escape the disease. In this connection it is interesting to note that although the past year was extremely dry in the Burdekin district, yet on account of more frequent and more regular irrigations it was generally agreed that the 1928 plant cane was better grown than the crops in most years of normal rainfall. At the same time our surveys show that the amount of Top Rot is much below average this year.

It is also thought that early fertilisation may play a big part in the control of this disease, and the fertiliser experiments now being laid out on representative farms, by officers of the Bureau, will help to test out this theory.

**Bundaberg.**

During the past six months an exhaustive survey has been made of farms in the Bundaberg district, with the object of finding what quantity of disease-free seed is available. We have now a list of some forty odd more or less isolated farms on which we have found no trace of gumming in the cane on each of three inspections. These farms will be inspected once or twice more before July, and a list of those considered safe sources of seed cane will be published.

A number of properties have been inspected as a result of their being offered as sites for the propagation of disease-free cane, and the pathologist will visit Bundaberg next month for the purpose of making a selection of these.

According to the Annual Report of the Mauritius Department of Agriculture for 1927, gumming disease is on the increase. A detailed survey showed that the disease was causing severe damage in the variety White Tanna, which constituted 56 per cent. of the total crop. The crop was about 15 per cent. below estimate, and this was stated to be due mainly to the ravages of gumming diseases.

In September, 1928, sixty-seven varieties of cane were imported from Hawaii in our endeavour to find gum-resistant canes. These varieties were held up for some weeks on account of the waterside trouble, but nevertheless some sixty varieties were germinated, and are now growing in quarantine. No canes will be liberated unless they prove to be disease-resistant.

The necessity for the quarantining of introduced varieties is emphasised by the fact that both Mosaic and Fiji diseases were reintroduced in the Brandes collection of New Guinea canes, which are growing in Sydney.

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## CANE PEST COMBAT AND CONTROL.

*The following report for the period March to April has been received by the Bureau of Sugar Experiment Stations from Mr. E. Jarvis, Entomologist, at Meringa, North Queensland:—*

"When will you growers fight that Beetle pest
The Weevil-borer? Please don't let it rest."

Some of you may ask the question—"But *when* and *how* should it be tackled?" In reply let me say that now, right away, is a good time in which to start a campaign against this serious cane borer. Every farmer can, if he wishes, carry out an interesting experiment to discover whether this insect has become established, or is trying to gain a footing, on his cane land. Just continue reading, and you shall learn how to do it.

Take about half a dozen thick juicy cane sticks, cut them into lengths of from 10 to 12 inches, and split each in half lengthwise with a cane knife. Now, lay these cut pieces on the ground side by side, touching each other, under a stool at the edge of a block of standing cane, and in a position affording shelter from direct sunlight. Arrange the sticks with the cut surfaces downwards, in the form of a little heap about 9 inches wide by 6 in height, and cover this over with a layer of moist trash about 3 inches thick, in order to prevent the bait-trap from drying too quickly, and secure damp, darkened, conditions. Examine this trap every second day to note the percentage of weevil borers attracted to same, which, when present, will be found under and amongst the cut sticks.

**The Trapping of Beetle Borers Meets with Success.**

The Chemist in Charge at the South Johnstone Sugar Experiment Station is having great success with this method of trapping beetle borers, and recently sent over 400 living specimens of this weevil to Meringa Experiment Station, to be used for breeding purposes in connection with the propagation of one of the most useful parasites of this notorious cane borer.

Growers should be able to get results similar to those mentioned above.

If ten to fifteen beetles are found in a single bait trap it will pay to lay down a dozen or more at distances of a few chains apart, in areas which may be thought likely—from previous experience—to harbour beetle borers, such as low-lying cane lands, or fields on which the cane has been partly blown over.

**Scattered Cane Blocks are a Mistake.**

When adding to your acreage of cane, the position of additional blocks should always be arranged as far as possible to form a direct continuation of the main existing plantation. By following out this plan the total length of headlands adjoining forest country can be reduced to a minimum, and less injury incurred from possible invasion of a cane farm from the outside by various sap-sucking and leaf-eating insects, such as grasshoppers, moth borers, leaf hoppers, &c.

**Destroy the Bread Ravager of Canefields.**

Our old enemy the "greyback" cockchafer is much in evidence just now on many cane areas, where, during seasons like the present, the sight of the extensive damage caused by its grubs must be very disheartening to those concerned.

What are you growers going to do about it? Leaving things to chance is poor policy, as the present situation calls for drastic action. Your wisest course is to make provision for combating the grubs of this pest next season.

Those intending to fumigate their cane should get into touch at once with the Entomologist at Meringa, in order that arrangements can be made in good time with the secretary of the Cairns Cane Growers' Association for the purchase of any fumigants required.

Farmers wishing to use paradichlor. will be able to purchase it at the price quoted last season—viz., £55 per ton.

Those favouring the carbon bisulphide treatment can procure this fumigant for about 38s. 6d. per drum holding 60 lb.

Destroy all Weeds Whenever Seen
It pays to Keep your Cane Land Clean.

It is necessary to impress upon growers the importance of clean cultural conditions. Never allow weeds to attain any size or to go to seed between the rows of cane, as in addition to the loss of a certain percentage of natural plant-food, and of manures that may have been applied to the soil, the mere presence of a bed of weeds serves to attract the attention of several minor cane pests, together with a variety of insects, which, after visiting the weeds and grasses, will naturally settle upon the cane, and may in time come to acquire a liking for the young heart-leaves.

The large moth borer, for instance, frequently invades such neglected plantations, the caterpillars of this pest having often been noticed destroying young shoots of plant and ratoon cane of the borders of blocks adjoining virgin forest country, and close to headlands left covered with blady grass and other weeds.

Furthermore, during the flighting or swarming period of our greyback cockchafer, a vigorous growth of vegetation between the cane rows will often induce the female beetles to deposit their eggs in such places.

# FUNGI AND BACTERIA.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

A plant may be said to be diseased when, owing to some condition of its environment or due to the presence of some associated organism, it is not able to display its normal state of development. In its widest sense the term "disease" would include the results of insect depredation, but it more commonly serves to designate plant troubles of the undermentioned types. The study of diseased conditions of this nature comes within the realm of Plant Pathology and is the work of the Plant Pathologist.

1. *Non-Parasitic or Physiological Diseases.*—These include general or local disturbances of the normal physiology of the plant owing to unsuitable environmental conditions, such as poor drainage, soil deficiencies, &c. The nature of these diseases is often obscure and in many cases the actual cause is unknown. Examples will be found in blossom-end rot of tomatoes and citrus exanthema.

2. *Parasitic Diseases.*—In this class are included diseases due to attack by members of several groups of parasitic organisms of which by far the most important are the fungi and bacteria. The great majority of diseases manifesting themselves in the form of definite lesions, such as leaf spots, fruit rots, &c., are caused by the presence of species from one or the other of these two groups.

3. *Virus Diseases.*—These are due to the presence within the plant of an infectious principle of ultra-microscopic size. Although little can be ascertained regarding the nature of the causal agent in these diseases, the members as a whole exhibit relationships which suggest that the group is a natural one. There are two well-known representatives in Queensland—bunchy top of bananas and spotted wilt of tomatoes.

## FUNGI.

To understand fully the nature of a fungus or bacterial disease it is necessary to have some realisation of what the causal organisms are like in their structure and habits.

The fungi are low down in the scale of the plant kingdom. Their nearest allies are the algæ, some of which constitute the simplest forms of plant life known, while the higher forms are represented by the seaweeds. In both algæ and fungi the vegetative state takes the form essentially of a slender tubular filament or by association of several filaments a tubular structure or flat plate may be formed. The external appearance may differ widely in the various species, which sometimes superficially resemble the shape of higher plants. Growth, however, can normally take place from the ends of the filaments only and the solid structure of the higher plants with all their specialised organisation depending on cell division both parallel and at right angles to the direction of growth never occurs.

Some fungi closely resemble the algæ in both vegetative and reproductive characters and they have probably evolved from the latter

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane.

group. One very important point of separation from the algæ, and higher green plants as well, is the fact that a fungus does not possess the green colouring known as chlorophyll. By the aid of this substance plants which possess it are able to build up out of the carbon dioxide of the air and water and salts from the soil all the material necessary for their growth. Since a fungus does not possess chlorophyll it is dependent for nourishment on material already elaborated by green plants, such as is to be found in dead and decaying organic matter or in the living substance of the plant itself.

## Structure.

The vegetative part of a fungus is known as mycelium, and consists of slender cylindrical thread-like filaments. (Plate 93, fig. 1A.) These are very fine and delicate, their diameter being usually somewhere in the region of $\frac{1}{3000}$ of an inch. A single thread of mycelium is known as a *hypha*. The cavity of the filament may be continuous, as, e.g., in some of the moulds, but in all the higher fungi it is divided by partitions or *septa* into a number of cells. The mycelium is composed on the outside of a thin pliable membrane which is a product of secretion of the living substance within. It is formed of a material differing somewhat from the ordinary cellulose of plant cell walls and in many cases consists rather of *chitin*—the substance going to form the shell of insects. Within the cell wall and lining it is the actual living matter of the organism. This is known as *protoplasm* and consists of a clear jelly-like substance. There is usually in each cell a small area of very highly differentiated protoplasm enclosed in a delicate membrane of its own. This body, known as the *nucleus*, is the all-important organ of the cell and controls the various growth and life manifestations of the fungus, such as assimilation and reproduction.

In a young cell the whole of the interior is filled with protoplasm, but as the cell wall expands and elongates with growth spaces known as *vacuoles* are left which become filled with watery cell sap. Reserve food material is often present in the cell usually in the form of granules of glycogen or animal starch and bright refractive globules of oil. Some fungi have colouring matter permeating the cell wall or dissolved in the oil globules. Growth of a hypha is a simple process. The terminal cell elongates. The nucleus divides and a transverse septum is laid down separating off the daughter nucleus and thus forming two cells. The new apical cell then enlarges and continues the growth as before. Branching takes place by means of a lateral extension from a cell of the hypha which takes on the function of a growing tip.

The form assumed by most of the less highly differentiated fungi in their vegetative state consists simply of a more or less interlaced mass of mycelial threads. Many of the higher forms by aggregation of hyphæ in a definite manner have produced more complex fungus bodies. The simplest of these is formed from the close interweaving, and in some cases fusion, of numbers of the hyphæ running together in a longitudinal direction. Definite fungal strands visible to the naked eye and known as *rhizomorphs* are thus produced. Sometimes the rhizomorph is differentiated into an outer thick-walled protective layer and an inner region of more delicate structure. A good example is seen in the black strands enveloping the roots of trees attacked by *Armillaria mellea*. The white strands given off from the base of mushrooms and

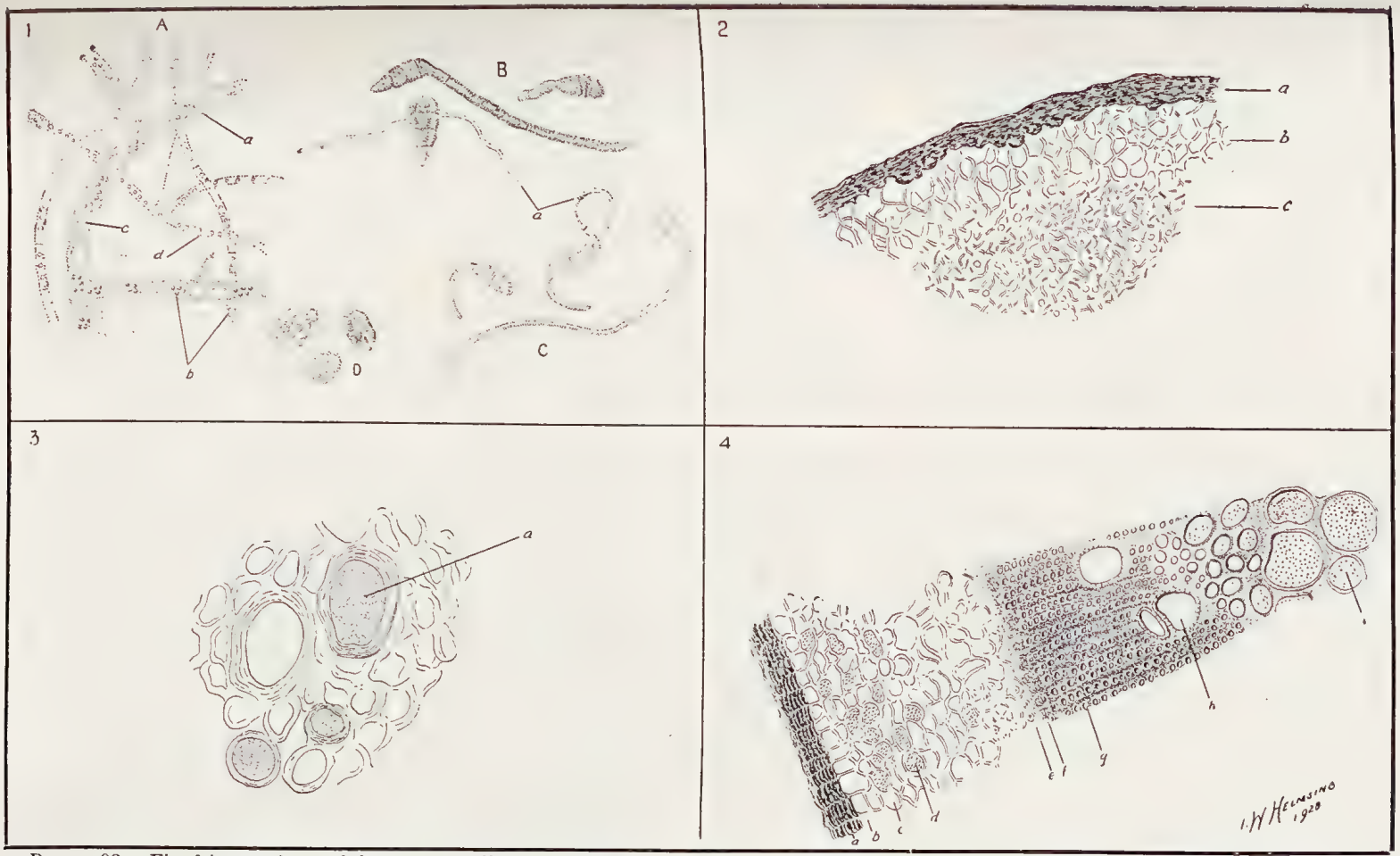


PLATE 93.—Fig. 1A, portions of fungus mycelium; *a*, protoplasm; *b*, food granules; *c*, vacuo es; *d*, septum. B and C, germinating spores; *a*, germ tubes. D, Zoospore formation in *Plasmopara viticola*. Fig. 2, segment of transverse section through a sclerotium of *Sclerotium rolfsii*; *a*, hard outer cortex; *b*, pseudoparenchyma; *c*, medulla, x 210. Fig, 3, portion of transverse section of cabbage stem showing Black Rot bacteria (*Ps. campestris*) in vessel at *a*, x 210. Fig. 4, segment of transverse section of persimmon shoot; *a*, cork; *b*, phellogen; *c*, parenchyma cells of cortex; *d*, starch grains; *e*, phloem region; *f*, cambium; *g*, xylem cells of

commonly known as spawn are of a similar type. By means of these organs a fungus can travel with its delicate tissues undamaged for a considerable distance through the soil.

The mycelial aggregate may take a more compact form, giving rise to firm irregular or spherical bodies known as *sclerotia.* These, by virtue of the development of a thick resistant wall to the cells of the outer layers, can act as resting bodies and serve to enable the fungus to withstand such adverse conditions as exposure to drying. (Plate 93, fig. 2.) Reserve food material is frequently stored up within their cells. Examples of sclerotia are seen in the black irregular disc-like bodies scattered over the tubers of potatoes affected with Rhizoctonia Scab. The rounded form is fully described for the sclerotial fungus included under the heading of Mycelia Sterilia.

More complex still are the structures developed by many fungi during their reproductive stage—e.g., such as are seen in the mushroom and bracket fungi. Here by interlacing and fusion of the hyphal filaments there may be formed a many-layered cellular structure resembling in superficial appearance that found in the higher plants. Such structure is known as *pseudoparenchyma.* It is shown in its simpler development in Plate 93, fig. 2.

## Reproduction.

So much for the mycelium by means of which a fungus grows over or within its host and attains food and nourishment for its development. The vegetative stage in most fungi serves as a means to one end—that being the development of a reproductive stage by means of which the organism is perpetuated from generation to generation.

In a few, reproduction takes place simply by means of broken segments of mycelium; in the majority, however, there is developed a special reproductive organ consisting of a single cell or at most a small cell aggregate known as the *spore* which corresponds in function to the seed of higher plants. Should a mature spore reach the right food material, and the temperature and moisture be suitable for development, its living contents will grow out into a slender delicate hyphal structure known as a *germ-tube,* which represents the first stage in mycelium development. With it commences once more the vegetative stage of a new fungus plant. (Plate 93, figs. 1 b, c.)

Spores are formed from the mycelium in two main ways—(1) *Endogenously*: In this case the contents of the modified mother cell known as a *sporangium,* become divided up into a number of smaller portions which may or may not develop cell walls of their own. These are finally liberated by rupture of the sporangium wall (Plate 95, fig. 1). In some cases, as e.g., in the fungus causing Irish Blight, the spores develop a fine filiform vibratile process known as *flagellum* which enables them to swim around in a film of surface moisture. Such spores are called *zoospores.* (2) *Exogenously:* Exogenous spores are produced from the ends of fertile hyphæ by a process analogous to budding. The top of the hypha becomes separated off by development of a septum, and the cell so formed gradually assumes the shape of the particular spore form of the species. Often the hypha is divided into a number of segments before shedding of the spores takes place, so that a chain of spores is produced. Spores produced in an exogenous manner are called *conidia* and the fertile hyphæ from which they are developed are known as *conidiophores.* (Plate 95, figs. 8, 9, 3b.)

Many fungi are *polymorphic*—i.e., they develop more than one spore form during their life cycle. (Plate 95, figs. 3, 5.) Commonly in one of these forms is represented a sexual stage. In the fungi this consists essentially in the union of the nuclei of two distinct cells either from the same or different fungal plants. The significance of this act is doubtful, though in some cases it may serve to invigorate the stock and preserve the characters of the race. The fruiting body developed in connection with the spores resulting from this act of union is usually referred to as the *perfect stage* of the fungus. Other methods of spore formation occurring in conjunction with a sexual stage are usually various modifications of the exogenous or endogenous types mentioned above. In the case of the occurrence of the former type the stage is usually referred to as the *conidial stage.*

The actual details of spore formation and the various supporting structures developed in connection with the process vary greatly in the different groups into which the fungi are divided, the groups themselves being largely established on consideration of the reproductive characters.

A description of some of the more characteristic types will be found in the chapter dealing with the classification of fungi.

## BACTERIA.

The bacteria rank next in importance to the fungi as causal agents of plant diseases. At one time they were considered to be parasites only of animals—a view since shown to be quite erroneous by the discovery of members of this group acting as the causal agents in many serious plant troubles. The bacteria are usually attached to the true fungi or Eumycetes as a separate division known as the Schizomycetes or fission-fungi. They resemble fungi to a large extent in their general habits, though differing from them morphologically, being of simpler construction.

Bacteria appear as sphærical or rod-shaped cells of extremely minute size. A quite average specimen might have a diameter of less than $\frac{1}{25000}$ of an inch. (Plate 93, fig. 3a.) The cell is bounded by a thin elastic outer wall or capsule within which lies the living protoplasm. From the wall of the capsule may extend one or more vibratile filaments known as *flagella,* which confer the power of motion on the species possessing them. The flagella may be polar or diffusely scattered. As in the case of fungi, there is no chlorophyll developed. Numerous granules may be imbedded in the protoplasm, but a definite nucleus such as is found in the fungi and all the higher plants appears to be absent.

One of the chief differences between the fungi and bacteria is in their manner of growth and reproduction. In the former growth is continuous from the apex of a hypha and reproduction takes place by the use of a specialised spore. The bacterial cell has no apical growth. A slight extension takes place and then the individual divides into two by simple fission. The two cells may separate and become independent, or they may remain more or less loosely associated end to end when by frequent division of each cell a chain of individuals is formed. Successive division may take place after intervals of half to one hour. At this rate the progeny of a single cell may in twenty-four hours amount to many millions. Fortunately, lack of suitable food material or environment and the toxic action of their own secretion helps to keep the

number down. A resting spore is formed by some bacteria. A portion of the protoplasm in a mother cell becomes somewhat denser, and round this is developed a special wall to form the spore. This appears as an ovoid refractive body lying within the mother cell. These spores are highly resistant to adverse conditions and can germinate readily after being subject to conditions fatal to the ordinary vegetative cell.

Most of the plant pathogens belong to the rod-shaped type. Of these the chief genera are *Bacterium*—non-flagellate; *Bacillus*—flagellate with flagella diffusely scattered; *Pseudomonas*—flagellate with polar flagella.

## MYXOMYCETES.

This primitive group of slime fungi are often associated with the Eumycetes and Schizomycetes as a third division, the Myxomycetes, under the term Fungi, using this name in a broad sense. The three divisions resemble each other in the absence of chlorophyll and certain characters resulting from this. The slime moulds constitute the lowest form of plant life, living as they do on the border line between plants and animals. They are unprotected in their vegetative state by a cell wall, and consist of a naked mass of jelly-like protoplasm. Most forms are saprophytes. One is the cause of the well-known Club Root of cabbage. None of the slime moulds are responsible for serious disease in this State.

## HABITS OF FUNGI AND BACTERIA WITH SPECIAL REFERENCE TO THE HOST PLANT.

To understand the effects a fungus may have on its host it is necessary to form some idea on the general structure of the flowering plants. It is therefore proposed to give here a brief outline of this subject.

### Structure of the Host Plant.

On general appearance a plant is at once seen to consist of roots, stem, and leaves, and with each of these is associated differences in structure and function. The roots serve to anchor the plant to its substratum and act as the absorbing organs for obtaining the water and mineral salts necessary for nourishment and for maintaining turgidity. If there is not sufficient water available to fill and distend the cells and thus confer a state of rigidity even on soft tissue, sagging and wilting will occur. The trunk and branches serve for support and display of the leaves and provide channels of communication between these organs and the roots. The leaves are the site of the elaboration of the various food constituents for which they serve as the receiving depôt. By means of the complex green colouring matter known as *chlorophyll* which is present in them, leaves are able to make use of the sun's light energy and by its aid absorb the carbon dioxide from the air and combine it with the water and mineral salts obtained from the soil by the roots. The first products of this chemical action are simple, but there is finally built up from these all the complex organic compounds which go to make up specialised plant structure.

The whole of the plant body, like that of the animal, is composed of a collection of minute cells. A plant cell differs from that of an animal in that it is provided with a wall of cellulose to which the rigidity of the plant structure is due. The individual cells are box-like or oblong

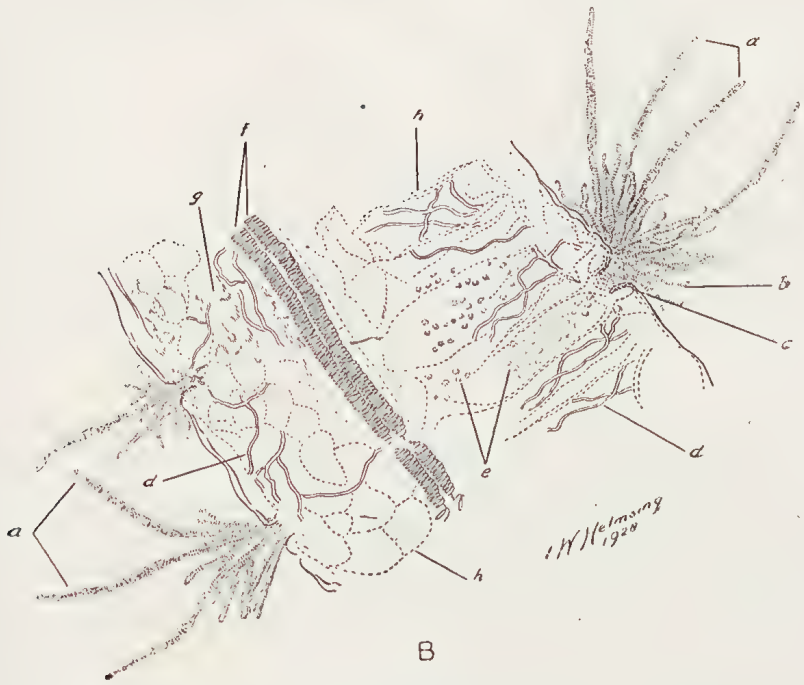


PLATE 94.

Fig. A.—The ectoparasitic type of fungus. *Oidium erysiphoides* as it appears on the surface of a marrow leaf infected with Powdery Mildew, x 210.

Fig. B.—The endoparasitic type. Section of leaf of the nightshade (*Solanum nigrum*) attacked by the fungus *Cercospora solanacea*; *a*, spores; *b*, conidiophores; *c*, stomata of the leaf; *d*, mycelium of the fungus; *e*, chloroplasts in cells not yet invaded; *f*, conducting vessels of vascular bundle; *g*, tissue disintegrating as result of fungus attack; *h*, cell walls, x 210.

and in general resemble the fungal cells described above. The cells of the leaf and other green parts contain embedded in the protoplasm, in addition to the nucleus and various food granules, small disk-like bodies known as *chloroplasts*. (Plate 94B.) These contain a fatty substance in which is dissolved green colouring matter—chlorophyll—on which as it has been shown the life processes of the plant depend. The higher plants differ from the fungi and algæ in that their cells have the power of dividing by walls parallel as well as at right angles to the direction of growth so that more solid structures can be produced. Young tissue consists of a mass of closely packed oblong cells, but as these distend somewhat with growth the walls separate slightly at the edges and minute intercellular spaces appear. It is by means of these spaces that the air reaches throughout the tissue, bringing with it the oxygen used in respiration. Should air be prevented access to any part such as by waterlogging of roots, &c., asphyxiation is likely to occur. In the plant there is nothing corresponding to the complex blood system of the animal which distributes throughout the whole body the oxygen on which life depends. Thus every cell of the plant must come in contact with air and breathe for itself.

The outer surface of a plant, at least in its young stages, is covered by a protective layer of cells known as the *epidermis*. This consists of a single layer of closely united cells whose outer wall is thickened by the deposition of corky or waxy substances which serve to prevent excessive loss of moisture and also protect the plant from invasion by parasitic organisms. At frequent intervals, especially on the under surface of leaves, minute funnel-like pores or *stomata* occur in the epidermis of the aerial parts through which air circulates to the inner tissue. (Plate 94B.) The stomata are rather a point of weakness in times of fungal or bacterial attack, as organisms unable to penetrate the protective epidermis are often able to gain entrance by their means. On the young fibrous roots very thin-walled tubular extensions of the epidermal cells act as the absorbing organs through which the desired soil solutions percolate. They are known as the *root hairs*. The delicate nature of these is sometimes made use of by soil-frequenting parasites which find in them an easy path to the inner tissues of the root. Developments from the epidermal cells of aerial parts may result in producing hairs, scales, &c.

In the branch and root of woody plants the epidermis later becomes replaced by a more substantial protective covering. A ring of cells lying just below the epidermis takes on the power of active division and is known as the *phellogen*. These cells divide by walls laid down parallel to the external surface and form a layer of closely-fitting oblong cells built up somewhat like bricks in a wall. The cells of this layer become impregnated with a corky material which with their tightly packed arrangement makes them specially suitable to resist adverse conditions of the environment and the attack of parasites. (Plate 93, figs. 4 a, b.) It is this layer, known as the cork, which makes many of the fungi attacking woody tissues dependent on wounds for their entrance. The cork, together with some of the underlying tissue, is that part of a tree to which the common name of bark is applied. After cork formation the place of the stomata is taken by patches of loosely packed cork cells through which the air is able to penetrate. Apart from the bark phellogen it is not usually normal for mature cells to take on the function of active division. However, this does occur in the case of wounds or

an invasion by parasites. A layer of contiguous cells surrounding the affected region assumes the function of a phellogen and deposits a protective layer of cork which cuts off the injured from the healthy tissue. The lesions of many fungi are definitely restricted in extent by a deposition of cork in front of their line of advance.

The radial growth of the stem and roots of the larger plants is due to the action of a ring of actively dividing cells having its origin in the growing point and extending back in the shape of a thin hollow cylinder situated some distance further in than the phellogen layer. This tissue in which active cell multiplication takes place is known as the *cambium*. From it are cut off on the side towards the centre of the stem cells which eventually become large cylindrical vessels, the walls of which become thickened and strengthened by a substance known as *lignin*. These cells in mass form what is commonly known as the wood and botanically as *xylem*. (Plate 93, fig. 4 e, f, g, h.) Besides lending support to soft tissue the xylem vessels serve as conducting tubes which convey water and dissolved salts from the roots to be used in the leaves. On the outer side of the cambium, cells divide to form a smaller number of narrow elongated cells known as *phloem* tubes, through which the food material elaborated in the leaves is conducted to other parts of the plant needing it. In some annuals and young plants the cambium may not be developed in a complete ring, in which case smaller patches of xylem vessels, cambium, and phloem, known as *vascular bundles*, form isolated woody strands running down the branch. Surrounding these and separating them from each other is a loose tissue composed of round or oblong thin-walled cells known as *parenchyma*. Parenchyma separates the phellogen and cork from the vascular tissue, and when present in the centre of the stem forms the pith. (Plate 93, fig. 4 c, i.) In the leaf, extensions of the vascular bundles of the branch form the veins. (Plate 94B, f.) Here the interlying parenchyma is particularly loose in arrangement so as to facilitate circulation of air amongst the chlorophyll containing cells and thus permit of ready assimilation.

Anyone wishing to go further into the subject of plant structure and physiology should provide themselves with "An Elementary Text-book of Forest Botany," by C. T. White, F.L.S.

### Saprophytes and Parasites.

As mentioned elsewhere, one of the essential points of difference between the fungi and bacteria and the rest of the plant kingdom is the normal absence of chlorophyll. As this green pigment is a chemical necessary for the manufacture of the carbon compounds out of which is built the great bulk of the structure of plant life, it follows that the fungi and other forms lacking chlorophyll have to fall back on the higher green plants or organic products derived from these for their supply of carbonaceous material. A little thought will show that the animal kingdom is also ultimately dependent on green plants for its food supply.

With reference to their method of obtaining a supply of organic food, the fungi and bacteria can be divided into two main groups.

(1) *Saprophytes.*—Under this term are included all the multitude of organisms that live on dead plant remains. These they break down into carbon dioxide, ammonia, and simple mineral salts suitable for absorption again by the roots of green plants, assimilating at the same

time substances suitable for their own nourishment. The saprophytes act as scavengers, and play a very important part in the economy of nature by preventing the excessive accumulation of waste material, which they place in a condition suitable for use again.

(2) *Parasites.*—As parasites are included all those organisms which are able to attack and obtain their nourishment at the expense of living plants and animals. This group includes all those fungi and bacteria causing definite plant disease.

The two groups are not clear cut. Sometimes an organism normally a saprophyte may invade and produce disease in a plant whose vitality is low on account of subjection to poor growing conditions or other detrimental agencies. These are known as *hemi-saprophytes,* as distinct from *true saprophytes,* which cannot attack a living host. Examples are seen in certain root rot producing organisms. Others, although capable of true parasitism, are able to live for a time on decomposing organic matter in the soil, and from there pass to a living plant should it come in contact with a suitable host. Organisms of this nature are known as *hemi-parasites.* Many species of *Fusarium* and *Rhizoctonia* causing crown and root trouble are of this type. The rusts and smuts are examples of the *true parasites* depending entirely on a living plant for their support.

Some weak parasites are only able to enter their host by means of wounds which rupture the normally resistant bark and expose the more delicate living tissue below. Some may even start as saprophytes on the dead tissue of the wound, and from there pass into the healthy region. Examples of these types may be had from the fungi responsible for collar rot in citrus, and in many of the organisms attacking the woody parts of plants.

Some fungal parasites choose a member of the animal kingdom for their host. A few of these are parasitic on man and the higher animals. Others serve a useful purpose, since they attack and destroy many of the scale and other insect pests, over which in a wet season they may exercise considerable control. The fruiting stage of these *entomogenous* fungi can be seen as a white or reddish tuft protruding out from beneath the covering of the dead scale.

### Ectoparasites and Endoparasites.

The parasitic fungi can be divided into two groups with respect to their method of living on their host. These are the *ectoparasites* and *endoparasites,* a grouping which is of considerable importance when control measures are being considered.

*Ectoparasites* are those fungi whose mycelial growth is out on the external surface of their host plant, where it forms patches of fine web-like covering. (Plate 94, fig. A.) From the hyphæ in contact with the epidermal cells short lateral peg-like branches are given off which penetrate the cells of the outer tissue layers, and from them absorb all necessary nourishment. The absorbing organs are known as *haustoria.* The Erysiphaceæ or powdery mildews are a large group of important plant parasites whose habits are of an ectoparasitic nature. This enables them to be effectively controlled by application of sulphur and sulphur compounds in the form of a dust or wet spray. Certain of the fumes given off by the sulphur cause the death of the superficial fungus mycelium without injuring the plant.

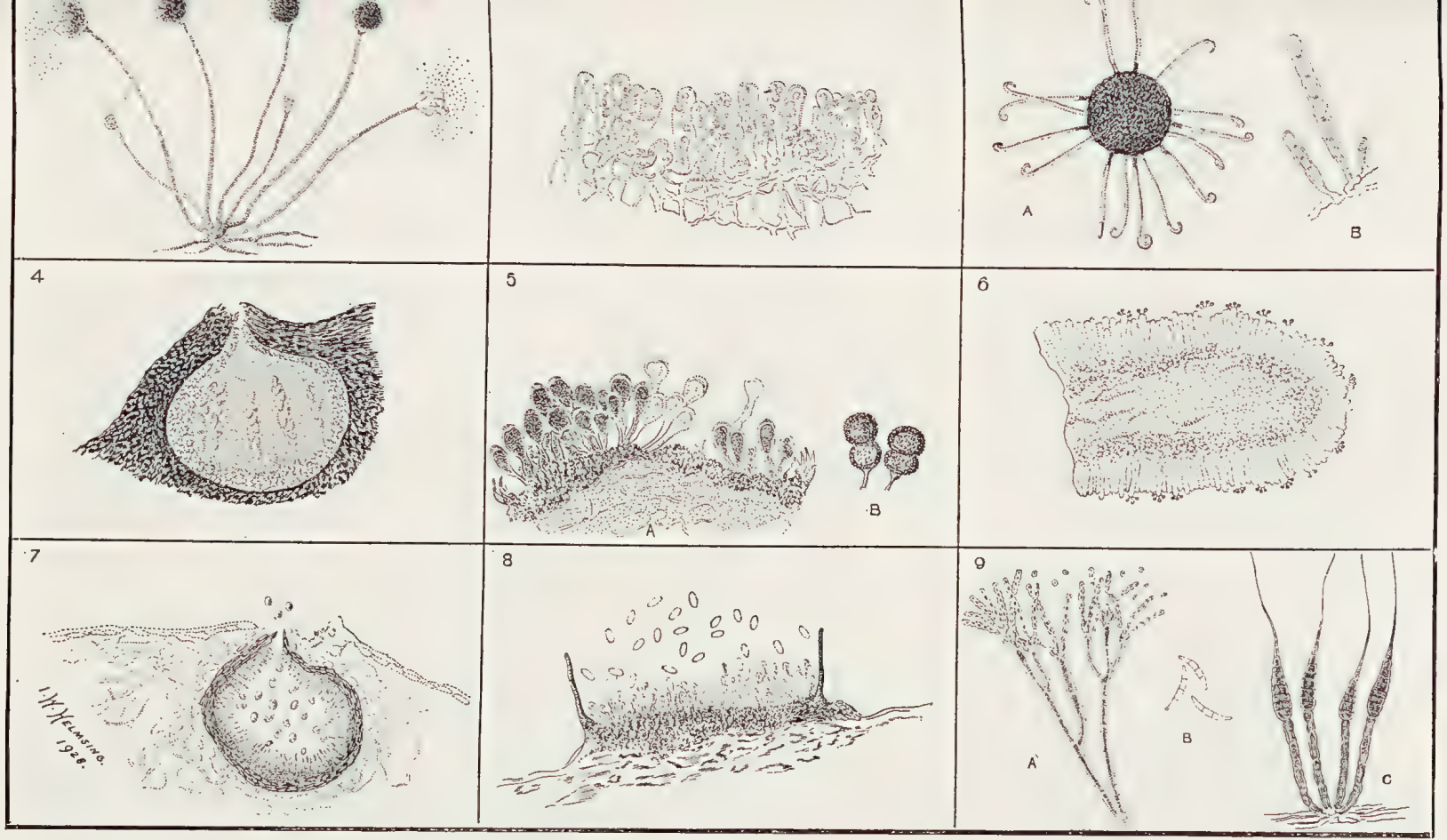


PLATE 95.—FRUITING BODIES OF SOME TYPICAL FUNGI.

1. *Rhizopus nigricans*. 2. Asci of *Taphrina deformans* on surface of curled peach leaf. 3. *Uncinula australiana*—A, perithecium ; B, conidial stage. 4. Perithecium and asci of *Glomerella cingulata*. 5. *Puccinia prunispinosæ*—A, uredosorus on peach leaf ; B, teleutospores. 6. Section through the gill of a mushroom. 7. Section through orange rind showing pycnidium of *Phoma citricarpa*. 8. Section through acervulus of *Glœosporium lindemuthianum* on French bean. 9. A, *Penicillium expansum* ; B, *Fusarium* spores ; C, *Alternaria solani*. (Figures x 210.)

In *endoparasites* the spore on germination grows out into a delicate hyphal thread known as the germ-tube, which penetrates the epidermal layer by dissolving the outer cell wall, or, when not able to do this, by making its way through the stomata or breathing pore. The hypha then branches, and the mycelium spreads throughout the tissue of its host, either growing in an intercellular manner between the cell walls and sending short haustorial branches into the individual cells for food supply, or else itself penetrating both intercellular and cellular spaces in its ramifying passage through the host tissue. The final result is usually death of the tissue in the part invaded. (Plate 94, fig. B.) The dissolving of the epidermal wall by the germ-tube and the subsequent penetration of the mycelium through the cell walls of the inner tissue is accomplished by means of an enzyme secreted by the protoplasm of the growing tip, which has the power of dissolving cellulose. Some fungi and bacteria secrete a toxic substance which kills the host cells for some little distance in advance of actual hyphal growth. This in a few instances may be of a distinct advantage to the plant, as the fungus is unable to obtain the living tissue required and dies. There are parasites, such as some of the smuts and rusts, which have reached a high degree of adaptation with their host, and no actual death of the tissue or *necrosis* as it is called takes place, although the mycelium may be present throughout the cells.

When once the fungus mycelium has penetrated within the tissue of its host it becomes more or less protected from the effects of external fungicidal applications. As the plant possesses nothing corresponding to the blood system of animals whereby a poison may be carried uniformly throughout the organism, it is necessary to fall back on a spray, which, when covering the surface of the susceptible host, will kill the germ tube before it can gain entrance to the interior. For endoparasites a spray such a s Bordeaux or Burgundy mixture therefore becomes necessary.

### Effect—the Parasite and the Plant.

The reaction between the host and parasite is usually specific for the fungus or bacterium attacking and the host species attacked. There are thus formed characteristic types of injury for each disease. Much often depends on the ability which the host displays in the development of a protective corky layer around the affected region, the lesion by this means being limited to areas of definite size.

Leaf infection usually results in spots of various size, shape, and colour. The plant may cut off the affected part by a corky layer, when the centre may drop out, leaving a shot-hole condition. The attack of woody parts may result in the formation of open wounds or cankers or extensive dry rot. When juicy fruit or succulent tissue is attacked a soft rot is commonly the result, especially when bacteria are the causative agents. The attack of a soil-frequenting organism may result in root or collar rot, or the water-conducting tissue may be invaded. In this case a wilting or gradual declining of the aerial portion of the plant is often the first symptom noted. When the leaves commence to die more or less uniformly from the margin, root trouble can usually be looked for—the region furthest from the source of water supply feeling the effect first. The fungus does not always kill the tissue of the host, but may stimulate its abnormal development. This occurs in the production of such malformations as peach-leaf curl, witches' brooms, fungus and bacterial galls, &c. Abnormalities also occur as a result of restriction in normal growth.

# BANANA EXPERIMENT STATIONS.

## KIN KIN.

*The following progress report of the work done at the Kin Kin East Experimental Farm has been received from the Acting Manager, Mr. H. J. Freeman:—*

### Preparations for Planting.

The desired site of approximately 15 acres was chosen for the conducting of different experiments in connection with banana growing at Kin Kin East, and clearing was carried out satisfactorily. Favourable weather conditions continued and the fallen scrub dried quickly. On 16th November the scrub was fired and resulted in a reasonably good burn. Owing to the position of the banana plantation on the adjoining property and the prevailing wind, the fire could not be lighted as soon as desirable, and the logging-up and burning-off was commenced on 21st November. Preparations for planting were commenced at the lower end of the area and the different plots were separated by good margins. Realising the necessity on an experimental farm for a plot of land available for planting at short notice, an area of approximately 3½ acres along the western boundary of the clearing was reserved and planted with a cover crop of beans (velvet and soya varieties). It would be quite possible to convert this land into a cultivated experimental plot at very short notice, whereas, if scrub had to be felled, months would elapse before such ground would be ready for planting.

Altogether 4,820 bananas have been planted and these include six varieties. Satisfactory growth has been made since planting, especially in the case of the Gros Michel variety.

### Experiments Conducted.

Experiments in steeping (dipping in different solutions for given periods), spacing, depth of planting, trimming, and fertilising have been conducted and baiting beetle borers has also received attention.

Slide tracks have been made and a carrying wire and windlass system have been erected. The building area has been securely fenced and preparations have been made for the fencing off of the whole cleared area. Excessive rain caused serious delay, and created a heavy weed growth, but the property throughout has been kept clean by several chippings. An experiment with weed-killing spray was also carried out on a small area of land.

## BARTLE FRERE.

*The following report on the work performed at the Experimental Farm, Bartle Frere, has been received from Mr. W. J. Ross, Assistant Instructor in Fruit Culture, Cairns:—*

### Weather.

For the quarter ended 31st March the rainfall at Cairns was 84.67 inches and although no records are available for Bartle Frere, it is thought that the rainfall there was a little heavier. The excessively wet conditions did not help to expedite the work on the Experimental Station, and it was fortunate that a "burn-off" of the felled area had been previously effected.

### Fencing.

A four-wire—2 barb, 2 plain—fence with a gateway in the centre has been erected along the front boundary of the recently felled and burnt area of 10 acres. Temporary barb wires will be run along the edge of the scrub on the south side in order to prevent cattle entering the area after it has been planted. It has been decided to erect a temporary bush hut for the purpose of accommodating tools and other materials on the farm. Dipping tank, mattocks, axes, shovels, and other necessary tools have been procured and are ready for use at the Experimental Station.

### Planting.

Ten acres are ready for planting and as soon as plants are available this work will be proceeded with. A further 2 acres, which are to be planted according to American system, are at present being bushed, and this area will be ready for planting on completion of the planting of the 10-acre area. It is proposed to plant 1 acre of Gros Michels in bushed area at 18 feet apart; also 1 acre in the 10-acre area at 15 feet apart. Over 300 plants will be required for this purpose. It is learnt that clean plants of the Gros Michel variety are procurable in the Kennedy district.

## QUEENSLAND SHOW DATES, 1929.

The following is the official list of Queensland Show Dates for 1929, as issued by the Queensland Chamber of Agricultural Societies:—

Charleville: 1st and 2nd May.
Taroom: 6th and 7th May.
Kingaroy: 2nd to 4th May.
Beaudesert: 1st to 4th May.
Mitchell: 8th and 9th May.
Boonah: 8th and 9th May.
Wondai: 9th to 11th May.
Mundubbera: 8th and 9th May.
Blackall: 7th to 9th May.
Ipswich: 14th to 18th May.
Roma: 14th and 15th May.
Springsure: 15th and 16th May.
Murgon: 16th to 18th May.
Gayndah: 15th and 16th May.
Goomeri: 21st and 22nd May.
Wallumbilla: 21st and 22nd May.
Biggenden: 23rd and 24th May.
Emerald: 23rd and 24th May.
Toogoolawah: 24th and 25th May.
Maryborough: 28th to 30th May.
Marburg: 3rd June.
Childers: 4th and 5th June.
Lowood: 7th and 8th June.
Gin Gin: 6th to 8th June.
Wowan: 13th and 14th June.
Bundaberg: 13th to 15th June.
Bororen: 17th and 18th June.
Gatton: 19th and 20th June.
Gladstone: 19th and 20th June.
Mount Larcom: 21st and 22nd June.
Buderim Mountain: 22nd June.
Rockhampton: 26th to 29th June.
Esk: 28th and 29th June.
Kilcoy: 4th and 5th July.
Townsville: 9th to 11th July.
Home Hill: 12th and 13th July.
Samford: 12th and 13th July.
Caboolture: 18th and 19th July.
Ingham: 19th and 20th July.
Rosewood: 19th and 20th July.
Laidley: 24th and 25th July.
Nambour: 24th and 25th July.
Bowen: 31st July and 1st August.
Maleny: 31st July and 1st August.
Nundah: 3rd August.
Royal National: 12th to 17th August.
Goombungee: 30th August.
Malanda: 18th to 19th September.
Beenleigh: 27th and 28th September.

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## WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

### *CASSIA LAEVIGATA* WILLD. (AN ARSENIC BUSH).

*Description.*—An erect glabrous shrub of 5-6 feet. Leaves composed of 3-4 pairs of leaflets, rhachis channelled above and with a prominent oblong upright gland between each pair of leaflets. Leaflets ovate-lanceolate, rounded at the base, and light or dark green above according to situation; much paler (glaucescent) below, varying in size but averaging about 2½ inches long and 1 inch wide. Flowers bright yellow, about 1 inch across when fully opened, borne in terminal or axillary corymbose racemes. Sepals light greenish yellow, unequal in size, the largest ones about 5 lines long. Petals deep bright yellow about 8 lines long. Stamens 10, 3 perfect, 2 on longer and 1 on a short filament, 7 small and sterile. Ovary green, curved, sessile. Pods cylindrical, usually about 3½ inches long; seeds numerous, flattened, about ¼ inch long, brown and shining, horizontally placed and separated by horizontal partitions.

*Distribution.*—A native of tropical America, now distributed as a weed in most tropical and sub-tropical countries, very abundant in Queensland.

*Common Name.*—In Queensland most commonly known as Arsenic Bush, a name originally applied to one or two species of yellow-flowered Hibbertias in North Queensland, now more commonly given to several species of Cassia, particularly the present one and *C. Sophera* var. *schinifolia.*

*Botanical Name.*—Latin *Cassia* (Gr. *Kasiz* or *Kassea*), a tree or shrub with an aromatic bark; *lævigata,* Latin meaning smooth as if polished, referring to the leaves and branchlets.

*Properties.*—Its local name would lead me to suppose the plant very poisonous, but I have never heard of deaths of stock from it. It is rarely touched by them, but if eaten in any quantity at all would no doubt act as a purge. Senna leaves of commerce are the product of several species of the genus Cassia.

*Eradication.*—Cutting off below the surface of the ground is most satisfactory in small areas. On large areas arsenical sprays might be employed. The weed is rather one of "scrub" rain-forest edges, along road-sides, &c., than of cultivated land or established pastures.

*Botanical References.*—*Cassia lævigata* Willd., Enum, Hort. Berol 441.1813.

PLATE 96.—*Cassia laevigata* (An "Arsenic Bush").

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING MARCH, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Mar. | No. of Years' Records. | Mar., 1929. | Mar., 1928. | | Mar. | No. of Years' Records. | Mar., 1929. | Mar., 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast—continued:* | In. | | In. | In. |
| Atherton ... ... | 8·98 | 27 | 8·87 | 7·69 | Nambour ... ... | 9·60 | 32 | 7·57 | 3·58 |
| Cairns ... ... | 17·88 | 46 | 29·66 | 21·83 | Nanango ... ... | 3·58 | 46 | 2·84 | 0·50 |
| Cardwell ... ... | 16·11 | 56 | 25·84 | 9·76 | Rockhampton ... | 4·74 | 41 | 3·67 | 2 92 |
| Cooktown ... ... | 15·23 | 52 | 10·39 | 24·78 | Woodford ... | 8·22 | 41 | 7·72 | 2·34 |
| Herberton ... ... | 8·12 | 41 | 10·45 | 6·74 | | | | | |
| Ingham ... ... | 15·58 | 36 | 26·41 | 6·89 | *Darling Downs.* | | | | |
| Innisfail ... ... | 26·20 | 47 | 26·46 | 34·50 | | | | | |
| Mossman ... ... | 17·56 | 15 | 19·93 | 15·47 | | | | | |
| Townsville ... .. | 7·53 | 57 | 9·91 | 7·16 | Dalby ... ... | 2·77 | 58 | 4·10 | 1·28 |
| | | | | | Emu Vale ... | 2·49 | 32 | 4·12 | 1·56 |
| | | | | | Jimbour ... ... | 2·64 | 40 | 3·05 | 1·11 |
| *Central Coast.* | | | | | Miles ... ... | 2·75 | 43 | 4·23 | 0·46 |
| | | | | | Stanthorpe ... | 2·70 | 55 | 3·82 | 1·86 |
| Ayr ... ... ... | 6·69 | 41 | 16·66 | 5·84 | Toowoomba ... | 3·85 | 56 | 5·65 | 1·61 |
| Bowen ... ... | 5·68 | 57 | 7·41 | 14·36 | Warwick ... ... | 2·57 | 63 | 4·34 | 1·19 |
| Charters Towers ... | 3·66 | 46 | 7·61 | 12 15 | | | | | |
| Mackay ... ... | 12·22 | 57 | 11·74 | 23·19 | | | | | |
| Proserpine ... ... | 12·36 | 25 | 15·19 | 17·13 | | | | | |
| St. Lawrence ... | 5·61 | 57 | 1·98 | 4·77 | *Maranoa.* | | | | |
| | | | | | | | | | |
| *South Coast.* | | | | | Roma ... ... | 2·70 | 54 | 2·57 | 0·78 |
| | | | | | | | | | |
| Biggenden ... .. | 4·08 | 29 | 2·02 | 1 78 | | | | | |
| Bundaberg ... ... | 5·42 | 45 | 2·49 | 0·93 | *State Farms, &c.* | | | | |
| Brisbane ... ... | 5·75 | 78 | 6·59 | 2·14 | | | | | |
| Caboolture ... ... | 7·81 | 41 | 8·53 | 2·44 | Bungeworgorai ... | 1·65 | 14 | 2·23 | 0·76 |
| Childers ... ... | 4·80 | 33 | 3·02 | 2·07 | Gatton College ... | 3·28 | 29 | 4·15 | 1·44 |
| Crohamhurst ... | 11·76 | 35 | 7·36 | 3·15 | Gindie ... ... | 2·67 | 29 | 2·42 | 1·95 |
| Esk ... ... .. | 4·91 | 41 | 9·53 | 2·63 | Hermitage ... | 2·26 | 22 | ... | 0·88 |
| Gayndah ... ... | 3·19 | 57 | 1·06 | 0·32 | Kairi ... ... | 8·32 | 14 | 7·88 | 10·16 |
| Gympie ... ... | 6·40 | 58 | 4·18 | 2·13 | Sugar Experiment Station, Mackay | 11·13 | 31 | 12·17 | 22·52 |
| Kilkivan ... ... | 4·05 | 49 | 1·22 | 1·37 | | | | | |
| Maryborough ... | 6·22 | 56 | 2·50 | 2·79 | Warren ... ... | 2·66 | 14 | ... | ... |

18th April, 1929.

GEORGE G. BOND,
Divisional Meteorologist.

## QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Scrub Box is a large tree of the coastal scrubs and rain forests. It is often absent from the interior of the very luxuriant rain forests or scrubs of Queensland. In these heavy forests it is mostly found on or near the margins. It is also common in the open Eucalyptus forests. The species is known in botanical terminology as *Tristania conferta*. It is sometimes called Brisbane Box and Brush Box. The bark on the lower part of the stem is brown or grey and somewhat rough and persistent. The upper part of the stem and the upper part or the whole of the branches have a smooth brownish bark. The trees in moist places often attain a large size, reaching 160 feet in height and 7 or 8 feet in stem diameter. The wood is fairly hard, heavy, and finely grained. It is brown in colour. When seasoned it should be useful for building work in which it does not come in contact with the soil. The species is found as far south as Port Stephens in New South Wales (J. H. Maiden) and as far north as the Burdekin River in Queensland (Bentham). It is also recorded from Port Darwin by Bentham.

*Photo.: W. D. Francis.*]

PLATE 97.—A LARGE SCRUB BOX (*Tristania conferta*) IN THE RAIN FOREST ON ROBERTS PLATEAU, MACPHERSON RANGE.

*Photo.: Dept. Agriculture and Stock.*]

PLATE 98.—SCRUB BOX (*Tristania conferta*).

A, flowering shoot; B, shoot bearing empty capsules. The long staminal bundles are conspicuous in the flowers.

# FARMERS' ORGANISATIONS.

J. F. F. REID, Editor of Publications.*

Probably there are no more overworked words in the language than organisation, co-operation, and co-ordination when used in relation to agricultural questions. In none of them is there anything magical. The application of the principles they imply means solid hard work, and the use of plain, ordinary, common horse sense. The great danger of co-operative enterprises and organisation schemes lies in the risk of their getting into the control of a hidebound bureaucracy, but that can only happen where those primarily concerned become too apathetic (lazy is the better word), to watch and safeguard their own industrial interests. We all know of undertakings that have been co-operated and organised out of existence, undertakings in which all effort has been put into organisation and none into the real business, with inevitably disastrous results. Even in private enterprise we have known commercial ventures so systematised that all the time of their staffs has been taken up in working the system, and none given to working the business. Farmers, through their own apathy, are not quite blameless for any failure that may attend efforts to organise their industry. Obviously no Government can do for an industry, or an individual, what they should do for themselves. All that a Government may do is to simply supply us with the machinery and the authority, and leave the rest to our own initiative, intelligence, influence, energy, capacity, and ability.

## A Road for Men.

I want to suggest that the progress which marks successful agricultural organisation in Australia to-day was not along a pleasant, bitumen-surfaced road, like the road to Redcliffe (or the road to Toowong!) but along a road on which hardship and difficulty were encountered at every turn, a road on which it was almost impossible to straddle deeply-worn ruts. It was not a track for sheep, but a road, the successful traversing of which called, and still calls, for the future towards which it is clearly blazed—for the strength of men to travel.

## The Farmer as an Economic Shock Absorber.

In every State in Australia to-day, there are farmers' organisations that are real live bodies with hearts pumping and arteries pulsating with good red blood. No longer, it is evident, is the farmer, whether of Queensland or Victoria, content to be the wood and water "joey" of the Nation, or to be regarded merely as a sort of convenient economic shock absorber for the kings of commerce in the overgrown coastal cities. Each State has now in operation a more or less official scheme of organisation from which definitely good results are being obtained by the agricultural community in the shape of social wellbeing and economic advancement. Developments in rural organisation in Queensland have been discussed before in the course of these talks, and are probably familiar to us all; therefore, it will be more interesting at the moment, perhaps, if we consider what some other States are doing in the way of improving the amenities of country life within the Commonwealth.

## A Southern Example.

For a start we will take South Australia, the great grain-growing State, where everybody blesses the name of Farrer—the deservedly famous Australian breeder of Federation wheat. Down there, probably the most important of rural organisations is the Agricultural Bureau, an association of practical working farmers, in effective, though by no means tape-tied (nor tongue-tied) relationship with the State Agricultural Department. I was down there scouting round "on the wallaby track" some little time ago, and had an opportunity of seeing for myself in a necessarily limited field, of course, this Bureau at work, and it impressed one as being altogether based upon a very sound system. It provides the point of contact between the farmer on the one hand, and the expert officers of the Department on the other. It is accepted as the principal channel through which the Department of Agriculture may distribute knowledge gained in the course of its research and investigational work on the experimental farms, in field plots, and in the laboratories.

Down there the common difficulty was experienced of interesting farmers in the work of research institutions, which had been equipped and staffed at great expense. Through the work of the Bureau this difficulty has been largely overcome, and its

* From a radio lecture through 4QG.

services as an institution for extension and educational work, are widely recognised and appreciated.

The Bureau, which has branches in every rural district, provides organised centres from which every farmer in the State can be reached, and so when occasion arises it is possible to establish contact with the farmers of a district in a body; an economical and efficient method when compared with the waste of time and effort involved in an individual canvass. And, because of this fact, it enables a relatively small technical staff to accomplish much more than it could were there no such organisation in existence.

### Departmental Outposts.

The branches of the Bureau are, in practice, really live and alert outposts of the Department in rural districts. The co-operation of the branches is sought in every way possible, in the arrangement of tours of duty for technical officers, in the planning and conduct of experimental tests, and in the collection of data on local agricultural matters. Through the Bureau advice on all problems affecting stock and crops, in health and disease, is readily available to farmers. They are encouraged as individuals or as bodies to visit departmental experiment farms and demonstration and experimental plots. Through the Bureau mutual understanding and respect between official and farmer are cordially cultivated.

In the process of its development a tendency of the Bureau has been to concentrate into hands especially trained to treat them, many of the problems, the solution of which is dependent on special knowledge and sustained inquiry .

Coincidentally, it has served to stress the importance of some organisation which provides, among other utilities, an effective educational means in respect to field and technical working plans and policies.

### Administration.

The administration of the Bureau is controlled by an advisory Board of Agriculture which is appointed by the Minister for Agriculture. Each year representatives of Bureau branches meet in congress in the capital. To enable branches to be represented at the congress the Government provides transport, without charge, for two delegates, and in many ways contributes materially to the success of what is really an annual Farmers' Parliament.

In addition to the annual congress, country conferences are held in different centres. The constitution, rules, and regulations are simple, elastic, and in no respect irksome.

Among other ways in which the Government, through the Department of Agriculture, assists local branches of the Bureau is by providing stationery and official postage, a copy of the State Journal of Agriculture to each member, and the services of expert officers as lecturers and advisers. Among the practical activities of the Bureau are the conducting of district pruning competitions, farm crop and cultivation competitions, field trials, a winter school for farmers, a Bureau library, and a reference library.

### A Women's Auxiliary.

A women's auxiliary, in the form of women's branches of the Agricultural Bureau, has also been established with excellent results. The underlying principle of the Women's Auxiliary is plain. When it is recognised that on the majority of South Australian farms, the poultry yard, the dairy, and the fruit and flower gardens are at least as much the care of the woman as of the man, it must be realised that to restrict the advantages of the Agricultural Bureau to one sex is to hamper unnecessarily the development of these industries. The frequency with which application was being made by women for admission to membership of existing Branches of the Bureau was sufficient to indicate that women were not unmindful of the advantages that the Bureau would afford them, particularly if concurrently with instruction in those aspects of agriculture referred to above they could be given opportunities of acquainting themselves with the principles of home economics; and it seemed reasonable to suppose that the system which for over thirty years had proved successful in so far as the farmer was concerned, was unlikely to fail in the case of the farm woman.

Help for the farm woman, both from the viewpoint of those branches of agriculture in which she was interested, and from the viewpoint of her domestic

responsibilities, was the objective, and the experience of several years suggests that the Women's Agricultural Bureau can and will perform a most valuable service in rural districts.

At each branch meeting common field problems and rural questions generally are discussed, either in debate or by means of contributed papers, and this has proved a particularly effective form of agricultural education.

From what I could see in every State, however, in rural organisation, Queensland is still in the lead, particularly as regards her pooling legislation, commodity boards, travelling technical schools, dental clinics, baby clinics, maternity wards, postal instruction, and rural schools, besides other valuable and important auxiliary services such as the Queensland Ambulance Transport Brigade (one of the most efficient systems in the world), and that provided by the Country Women's Association and other organisations, religious, educational, and social, that are doing so much to help us in the attainment of a complete national life.

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## LEGUMES—THEIR IMPORTANCE.

Every farmer is now familiar with the group of plants known as legumes (so called because their "fruit" which contains the seeds is a legume or pod). These plants are of the highest value and possess characteristics that distinguish them from all others, notably the high protein content of their seed, the excellent feeding value of their whole vegetative system, and their capacity for storing nitrogen in their roots and thereby leaving the soil actually enriched in that important item of plant-food.

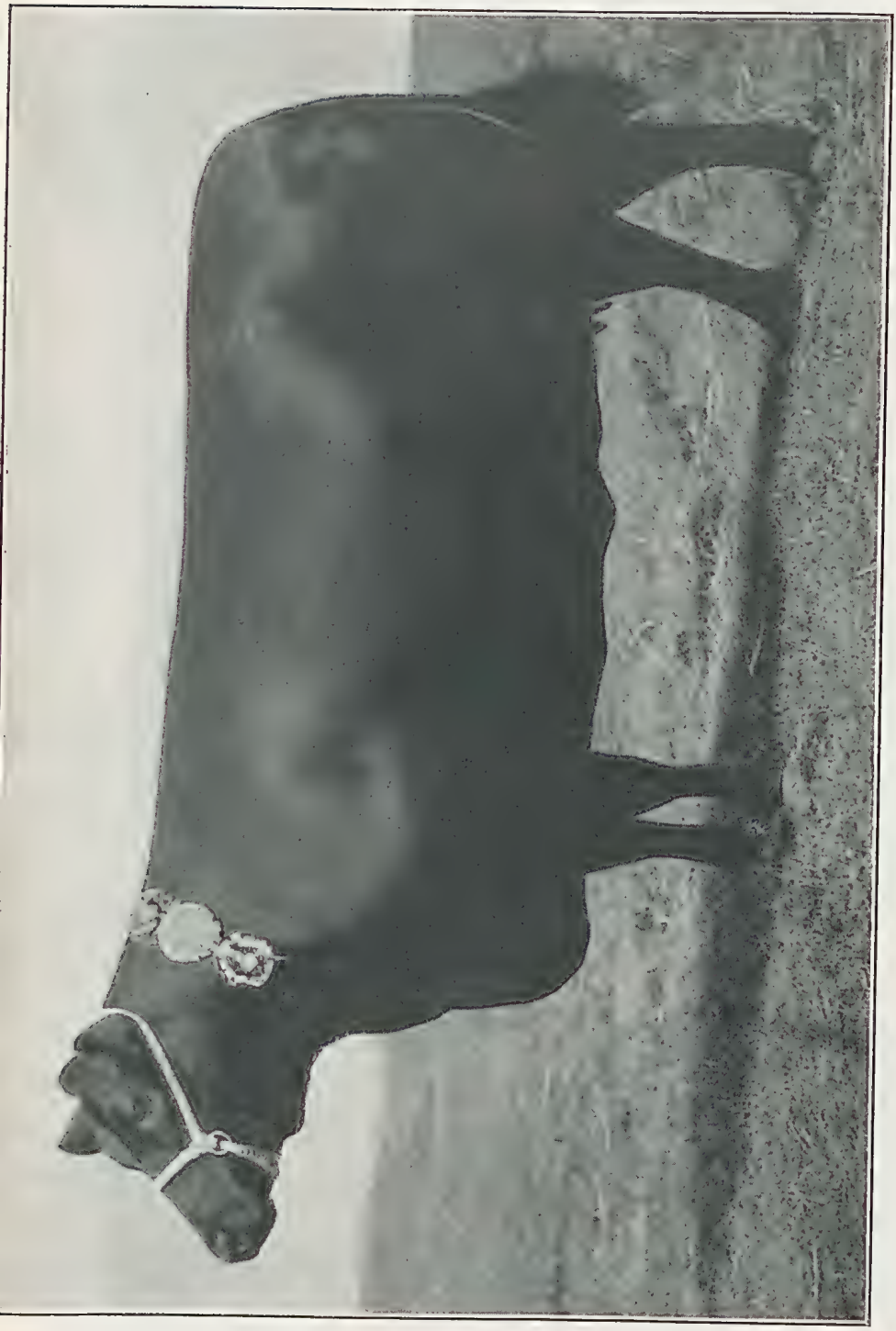
In New South Wales legumes are grown for various purposes: Lucerne for hay and grazing, clovers as an important constituent of pasture mixtures, field peas, vetches, cowpeas for green fodder and hay, and also for green manuring and soil renovation, and garden peas and beans for the vegetable market and home use. Their place in our farm practice, indeed, is even larger than might be apparent at first sight, for the "herbage" that springs so abundantly on wheat lands when these are "left out," and that is so highly esteemed as pasture, consists largely of trefoils, which are as much legumes as lucerne or clover.

The secret of the value of these plants to the farmer is the possession of a source of plant-food that is not accessible to most other plants, particularly not to cereals. The practical experience of hundreds of years led farmers of past generations to believe that leguminous crops possessed some peculiar power of making succeeding crops grow better, and it was not till the last twenty-five or thirty years that this could be explained. It is now known that association with certain bacteria in the soil enables legumes to make use of the air in a way that other plants cannot.

This association is one of mutual helpfulness, or symbiosis, the bacteria requiring considerable quantities of certain kinds of foods that are generously supplied in the plant juices of legumes, while the plants derive from the bacteria, in some way not yet fully understood, a supply of nitrogen that the bacteria have taken from the air and built into nitrogen compounds within their own cells. It is supposed that the nitrogen compounds thus manufactured by the bacteria are diffused through the cell walls and absorbed into the general circulation of the plants, where they are used for the building up of the protein compounds that are characteristic of the legumes in whatever form they are considered.

The presence of these bacteria is indicated by the development on the roots of the little growths now universally known as "nodules." These little swellings vary from the size of a pin-head to the size of a small pea, and they may sometimes be seen by carefully digging up a plant with as many of the small roots as possible and then washing away the earth in a gentle stream of water.

There is unfortunately an impression amongst farmers that, if the leguminous crop is removed from the land and the roots with their nodules remain, the soil is thereby enriched in nitrogen. It must be clearly understood that the nitrogen taken from the air by the organisms does not exist in the nodules, but is made use of and distributed throughout the plant, and that the removal of the above-ground portion of the plant from the land means the removal of a large amount of nitrogen. An increase in the nitrogen content of the soil can only result from the growing of leguminous crops when they are fed off, ploughed in, or soiled to stock, and the resultant manure from the stock returned to the soil.



*From "Farming"—an English Publication.*] PLATE 99.—BRITISH BREEDS OF LIVESTOCK.
The type of Aberdeen Angus Cow favoured by breeders in the Old Country.

PLATE 100.—BRITISH BREEDS OF LIVESTOCK.
A type favoured by Jersey breeders in Britain.

*From "Farming"—an English Publication.*

## AUSTRALIAN PIG INDUSTRY COUNCIL—ANNUAL MEETING.

At the third meeting of the Council for the Australian Pig Industry held at the Commonwealth Bank Offices, Sydney, on 25th March last, representatives were present from New South Wales, Queensland, Victoria, Tasmania, and South Australia, as well as from the Commonwealth Department of Markets and Transport. Mr. George W. Gordon, of Raleigh, New South Wales, was re-elected chairman and presided over the gathering.

The Council approved of the appointment of Mr. A. F. Gray, Senior Piggery Instructor, Department of Agriculture, New South Wales, and Mr. William Gamble, a member of the Victorian Council of Agricultural Education, to represent the Agricultural Colleges on their State Pig Industry Committees. It was also approved that Mr. Mitchell be a representative of the New South Wales Pig and Poultry Farmers' Association on the New South Wales committee. It is expected that a recommendation will shortly be made by that committee for the appointment of additional representatives to the Committee of the Proprietary and Co-operative Bacon Factories.

With reference to the question of forming committees in each of the States for the stabilisation of prices the chairman reported that a body of this nature had been formed in New South Wales under the title of the New South Wales Bacon Curers' and Distributors' Association, consisting of proprietary and co-operative bacon manufacturers and wholesale agents. The Queensland members intimated that the Queensland Bacon Curers' Association, comprising proprietary and co-operative companies, which was formed some time ago and which determined terms and conditions of sale and the matters relating to the branding of bacon in Queensland, was working smoothly and satisfactorily. The Council recommended that similar Associations be formed in Victoria and South Australia.

### Experiments in Breeding Pigs.

Mr. A. J. Mackenzie, Instructor in Animal Husbandry, at the Gatton College (Queensland), gave an interesting address on the experiments in breeding pigs being conducted at that College.

### Pig Nutrition.

A paper on Pig Nutrition was prepared by Mr. Lance le Souef, Melbourne, and copies were distributed to the members and referred by the Council to the State Pig Industry Committees for comment with the object of discussion at the next meeting of the Council.

### Propaganda to Increase the Home Consumption of Pork Products.

After reports were received and progress in the different States noted, it was decided to refer the matter back again to the various State committees for further action.

### Fire Branding of Pigs.

The New South Wales committee reported that provision had been made in the new draft of the proposed amendment to the Pastures Protection Act for the inclusion of a clause which would give certain powers to carry out the wishes of the Committee with regard to branding pigs. The Victorian Committee considered it was not necessary to request the State Government to introduce legislation to provide for the compulsory fire branding of pigs. Experiments are being conducted in that State in the tattooing of pigs. The State Committees are to submit further reports at the next meeting.

### Inspection Certificates.

The question of the acceptance by State authorities of certificates relating to pork products issued by the inspectors of other State Governments was considered. It was stated these certificates are already accepted by the Victorian and Queensland Government Departments. The matter was referred to the New South Wales and South Australian committees for further report.

### Mortality in Young Pigs.

This question is now being investigated by the Council for Scientific and Industrial Research and it was decided by the Council for the Australian Pig Industry

to ask State Government Departments, Agricultural Colleges, and other bodies conducting experiments with regard to the breeding and feeding of pigs to give special consideration to the subject of mortality in young pigs.

### Payment of Compensation for Pigs Condemned on Account of Tuberculosis.

A lengthy discussion took place on this subject and it was definitely decided to refer it to the State Committees of New South Wales and Victoria for further consideration as far as their respective States are concerned and for report to the next meeting of the Council.

### Transmission of Hams per Parcel Post.

The Queensland members intimated that there was a good demand for hams to be despatched per parcels post, particularly at certain seasons of the year, e.g. Christmas and Easter. It was therefore decided to approach the Postmaster-General's Department with a view to having postal regulations amended in order to permit the acceptance for transmission by parcels post of hams securely packed and of a maximum weight of 15 lb. Present regulations do not permit of this.

The next meeting of the Council will be held in Brisbane immediately prior to the Brisbane Show in August next.

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## PIGS AT TOOWOOMBA SHOW—1929.

A particularly good entry of fine quality pigs, placed before the judge under much more favourable conditions than is possible at many of the smaller country shows, was evidenced at this year's Toowoomba Show, where, under favourable weather conditions and with bright seasonal prospects, the entry indicated the growing importance and popularity of this branch of agriculture on the far-famed Darling Downs.

The time taken in preparation and the enthusiasm displayed by the various exhibitors indicate the future success of the industry. If one can judge by the quality of the stock, and particularly the very fine entries of bacon pigs, then pig raising will continue to be a profitable and popular venture and the stock produced will be in great demand in Southern Queensland.

The pig industry on the Downs appears to be on a very sound financial basis and judging by the capital invested in the Darling Downs Co-operative Bacon Company Limited, and the results of the year's activities at the factory at Willowburn, it is apparent that "money in pigs" is no mere slogan but an actual fact. It is evident, too, that the products of the factories on the Darling Downs (for there is another successful factory at Mill Hill, near Warwick, conducted by the Warwick Bacon Company Limited) continue to find a ready market not only in this State but in the markets of the South where profitable prices are obtained.

### Breeds.

Berkshires and Gloucester Old Spots were equal in general average, though there were more entries of the former than of the latter. Tamworths made a good showing as also did a very fine pair of Duroc-Jerseys, but the Yorkshires and Poland-Chinas were not up to standard and were present in very small numbers.

The porkers were an even lot and the eight pens, each containing three prime quality bacon pigs, were equal to any in the State. They were all shown in excellent marketable condition.

The veteran Council Steward, and the officer in charge of the Pig Section, together with the exhibitors, endeavoured to make the section an attractive and popular one, and the fact that so many people interested themselves in the exhibits was sufficient justification for the space allotted and the expense incurred in penning such a fine exhibit.

### Hams, Bacon, Lard, and Small Goods.

The display of hams, bacon and other factory products was of high standard and indicated the wide range of products obtainable from the carcass of the hog. Unfortunately, competition was reduced to the exhibits of the Darling Downs Co-operative Bacon Company Limited, but, nevertheless, the quality was of such a high standard that any other competitor would have to show exceptionally good products in order to win. The trade display of bacon factory products was attractive and of great educational value.

## SCHOOL OF INSTRUCTION TO PIG FARMERS AT GATTON COLLEGE.

Attention is called to the annual school of instruction to pig farmers, to be held at the Gatton College during the period 10th to 20th June, 1929.

The schools have been organised to provide the means whereby farmers, their sons and daughters, desirous of improving their knowledge of pig-raising, may come together at a convenient centre for the purpose of meeting one another and attending practical demonstrations and lecturettes, indoor studies, &c., on every phase of pig-raising.

As early application is necessary, it would be well for those interested to get in touch with the Principal of the College so that arrangements may be made in ample time before the school opens.

Professor Murray advises that there need be no fear on the part of the farming community with regard to the attendance at this school of members of their families, for provision has been made for accommodation and meals, and those attending can be assured their personal wants will not be overlooked. The social side of the life of these schools is a special feature. Every evening before the lecture session begins, a free and easy hour for questions and answers, during which questions relative to any branch of agriculture may be asked, has been arranged. At these sessions officers attend who are interested in other branches of college life; in fact, question time is one of the most interesting periods of the day for those interested in orcharding, dairying, and other branches of farming, as well as pig-raising. The evening cinematograph and lantern lectures are also of interest and value and are much appreciated. As opportunity offers, prominent authorities on agriculture, apart from departmental officials, will give addresses. An added attraction to the school programme is the visit of inspection to the metropolitan bacon factories.

The school fees are exceptionally reasonable and concession fares on the railways are available to those attending. Further particulars may be obtained by writing to the Principal, Queensland Agricultural High School and College, T.P.O. South, or from the Department of Agriculture and Stock, Brisbane.

It might be mentioned that at the College piggery more than 300 pigs are kept. These comprise representatives of the several breeds in Queensland, and they are bred for stud purposes as well as for the production of pork and bacon. An extensive series of experiments in the breeding of pigs has been recently added to the activities of the pig section. These experiments are under the control of the Departments of Public Instruction and Agriculture and Stock, and of the Queensland Pig Industry Committee as representing the various bacon factories. Considerable interest is being displayed in the results of crossing the various breeds together, and this section should be of considerable interest to those attending the Pig Farmers' School. Several lecturettes will be arranged to indicate just what is being done, for the objective is to test out under farm conditions the prolificacy, suitability, early maturity, and economy of production of various types of pigs. The pig section, therefore, is one of great educational value and one in which farmers generally will be interested.

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*A VALUABLE HELP.*

*A Bauple reader writes (4th March, 1929):—"The Journal I find is a most valuable help to me in many ways. The advice and hints contained therein, if followed closely, do much to make farm life and work more easy; so much so, in fact, that much useless labour may be omitted and much more profitable work accomplished. The fact is that work done does show more satisfactory returns when the Journal's advice is put to practical use. Wishing you and it every success."*

# WEANING THE PIG.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

ONE matter worthy of special attention on the pig farm is that dealing with the correct age at which to wean pigs. There is no hard and fast rule that must be followed to ensure success, as the age at which to wean pigs will depend largely on the system of management that is followed on the farm and the development of the litter. If it is intended (as it should be) that the sow is to produce two litters yearly, it will be necessary to wean the pigs as early as practicable in order to allow the sow being mated in time for the next farrowing. For this reason, it is advisable to wean the pigs when they are eight weeks old. The sow carries her pigs for four months (the gestation period is usually 112 days), and suckles them for two months, making six months in all with each litter. Generally the sow will come in season three days after farrowing, and every three weeks after that, although it rarely happens that the sow will show as being "on heat" before the ninth week after farrowing, and it is at this ninth-week period when she should be mated to the boar.

Some breeders are able, in the case of a sow with a very small litter, to induce the sow to come in season by keeping her and her litter separated for several nights in succession at about the sixth week after farrowing, or even sometimes at the three-day or three-week period. In such cases it is an advantage to feed the sow liberally after going in pig and to allow her to suckle her pigs for a longer period;

PLATE 101.

A group of weaners of the Berkshire type engaged in a hunt for peas in a crop of cow peas into which they were turned to graze while they were passing through the weaning and slip stages. The other food consisted of milk and cereal meal and they had ample drinking water and charcoal.

but this system can only be recommended in cases where the sow has a small litter or where she is carrying plenty of condition, for the gestation and lactation periods are severe on the dam and impose a double burden on her at a time when she should be building up her body in preparation for the litter to arrive and be suckled.

If the young pigs, when about three or four weeks old, are provided with a small trough (concrete, steel, or block tin preferred) placed in some convenient spot where the sow cannot get at it, they will soon learn to eat and drink freely, and if they are also allowed good pasture the process of weaning will not be difficult and the pigs will not be checked in growth; also the strain on the sow will not be so great if the young pigs are handled in this way. Both sow and suckers should be allowed an abundant supply of drinking water. On the other hand, if the young pigs have to fight for a mouthful of food at the trough where the sow, and, perhaps, other pigs are feeding, then the weaning period will be severe on the pigs, and the sow will not do as well. For three or four days before weaning the sow should only

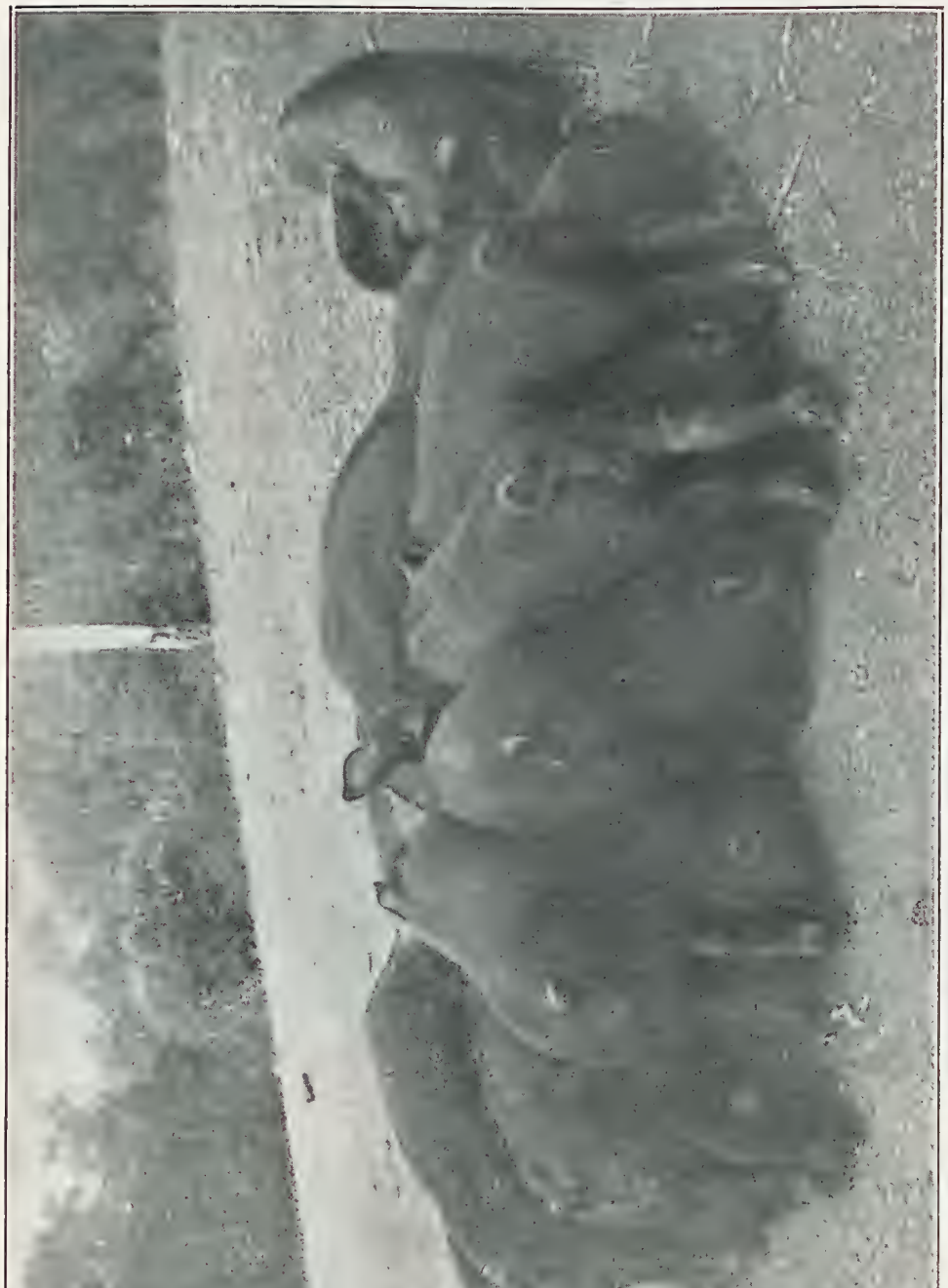

PLATE 102.—A THRIFTY PROFITABLE LITTER.

Tamworth-Berkshire Pigs, fourteen in number. They were eight weeks old at the time the photograph was taken. They were the property of Mr. George Stanfield, of Wondai, Q.

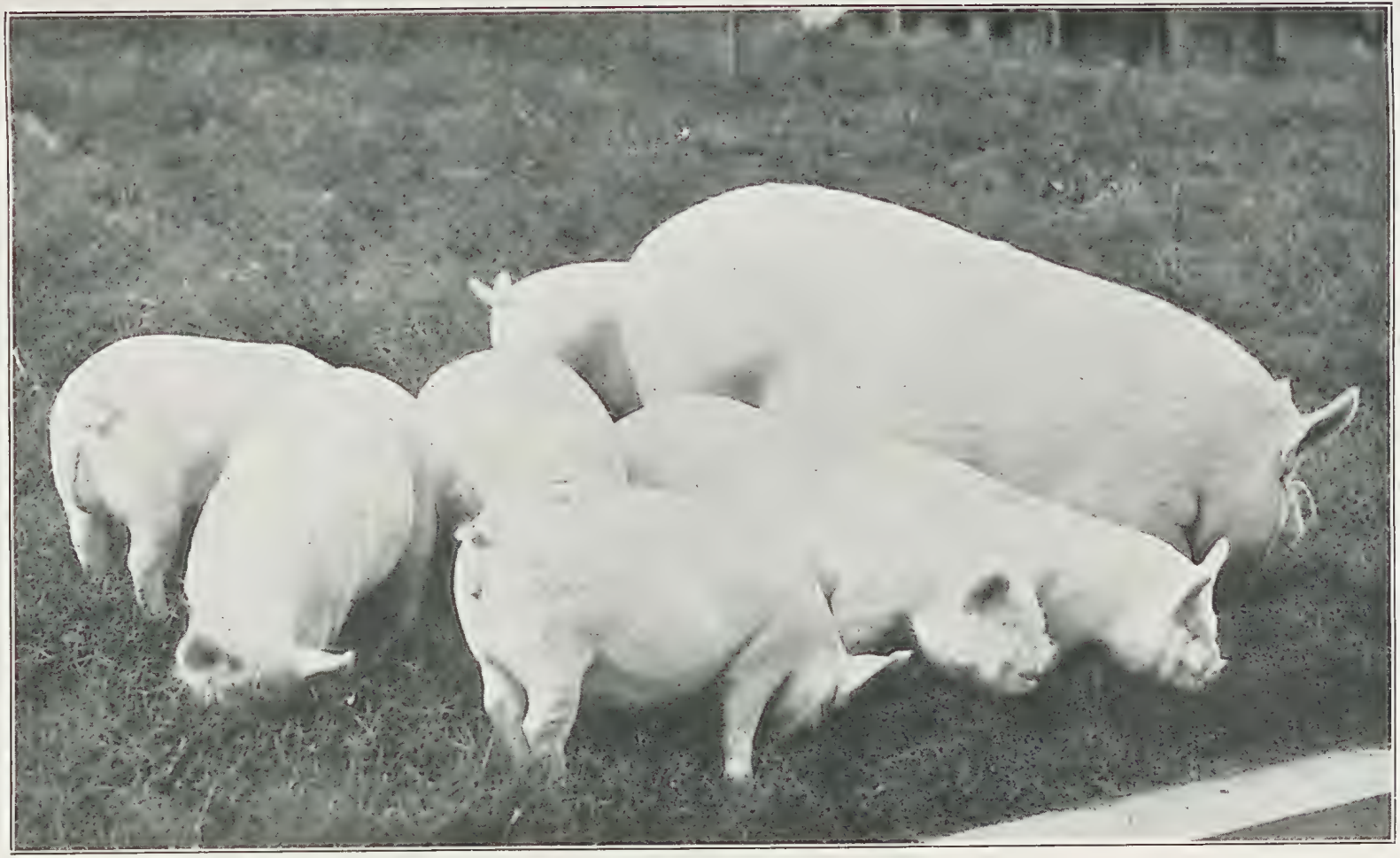

PLATE 103.

Prize winning weaners of Middle Yorkshire breed, property of Mr. Ralph Joyce, a prominent Victorian breeder. The sow only reared seven pigs of this litter, but she made an exceptionally good job of her share of it, while the owner did not spare the feed given to the rapidly developing

receive about one-half of her ordinary ration; this will cause a decrease in the milk flow. The sow should then be taken away from the litter, leaving the young pigs in the surroundings to which they have become accustomed. The pens and pastures in which they are kept should be clean, sanitary, and of good area, and so be conducive to rapid growth. The sow should be carefully handled until her milk supply ceases. Some breeders allow the smallest pigs to remain with the sow for about a week after the largest ones have been weaned, and this practice is to be commended, particularly if the sow has an abundant supply of milk and has been rearing a large litter. It is a decided advantage, if it can be arranged, to allow a small, weakly litter to remain with the sow until the pigs are about ten or twelve weeks old, in order to give them the additional benefit of the sow's milk, but this is seldom necessary if the young pigs are taught to eat from a separate trough whilst still suckling.

Young pigs should be given an allowance of lime water in their food two or three times a week; they should also have access to clean water, and should be provided with charcoal, bonemeal, wood ashes, and a lump of rock salt. Under these conditions, weaning should not check the development of young pigs.

Profitable pigs should grow rapidly, mature early, and be ready for marketing as soon as possible at the lowest cost of production, with the least amount of labour, and with the maximum of saleable meat and a minimum of loss. This cannot be done unless they receive a good start in life and unless they recover from weaning without the all too common check in growth. Strictly speaking, the time to start caring for young pigs is long before they are born, for the strength and development of the pigs at birth depends entirely upon the feed, care, and attention given to the sows, and upon the type, quality, and condition of the sires. In addition to this, the very best pigs may be absolutely ruined and checked in their development if special care is not taken to see that they pass through the weaning stage without loss in weight or check in growth.

### Do not Wean Pigs too Early.

It is a serious mistake to wean pigs at four, five, or six weeks of age and expect them to develop and mature to advantage, especially where, immediately after weaning, they are offered for sale and transferred to new owners. They then receive a change of food and environment and entirely new conditions of life. Pigs treated in this way seldom prove a good investment. If they survive they develop into slow growers and are unprofitable. Of course, even these adverse conditions can be overcome by giving them extra care and attention, but the system is not to be recommended, for, by allowing them to remain with the sow for another two weeks they would develop to more advantage and sell better. Breeders who handle pigs in large numbers and feed them on the refuse of hotels, cafes, markets, and on butter milk, will not purchase very young pigs, for they have learnt that such pigs are not profitable. Taking the amount of profit into consideration, the sow's milk is the cheapest and most efficient food for pigs of one to three months of age, supplemented (after the first month) with other and equally nutritious foods. It is more profitable to give the sows additional supplies of food in order to obtain continuous milk production, than it is to wean pigs at six weeks and attempt to force them on more rapidly than they will develop while suckling. If the food which the very young pigs are receiving is supplemented in the manner indicated, the result will be far more satisfactory, both for the litter and the sow. The sow's milk production may be increased by efficient feeding and handling in just the same way as milch cows, and every dairy farmer knows how rapidly the milk flow increases when conditions are favourable and a good supply of food is at hand.

### Castrate the Young Boars at Six Weeks.

It is an advantage to castrate all male pigs not required for breeding purposes when they are six weeks of age and before sexual maturity is reached, as at this age there will be considerably less shock to the nervous system and the growth and development of the pig will not be checked. If the pig is still suckling its dam when castrated, the wounds, if kept clean, will heal up rapidly, and the pig will become more thrifty, and will be in a better condition for weaning. A five or six-weeks-old pig is small enough to be handled conveniently, while the testicles will be large enough to render their removal easy. If the castration be correctly performed, within a few minutes of being released from the operation the young pigs appear normal and are soon suckling and eating again, while older pigs are sickly, sore, and very stiff for several days, eating and drinking little. There is also considerably less pain associated with the operation if performed at six weeks of age.

### Weaning, an Important Subject.

It will be seen, therefore, that weaning the pig is quite an important item in the profitable management of pigs. Further information may be obtained at any time on application to the Department of Agriculture and Stock, Brisbane, where, also, many useful pamphlets on pig raising may be obtained gratis.

PLATE 104.—A PRIZE-WINNING LITTER.

A prize-winning litter of Middle Yorkshire pigs at weaning age. Note evenness of type and good quality of these pigs, and the medium condition of the sow.

# USE AND CARE OF MILKING MACHINES.

## Milking.

Keep the milking shed, yards, and surroundings in a clean, sanitary condition. Wash the cows' teats in clean water, and draw milk from each teat and ascertain if the milk is normal before putting on the teat cups. To place the teat cups in position bend them all down except the one you are going to attach to the teat; attach each cup in like manner. When the cups are all attached and the milking is proceeding satisfactorily, do not interfere with the machines until the cow is milked out. See that no air enters the cups and destroys the vacuum; this defect is indicated by a hissing sound caused by the air rushing into the cups.

Should a cup fall off the teats give it immediate attention, as the suction will draw dust and particles of dirt into the system and contaminate the milk.

The cleansing of the milking machines is the most important part of the dairyman's operations. Failure to thoroughly wash and properly cleanse the plant after each milking will result in the production of low-grade milk, cream, and dairy products.

## Cleansing the Machines.

After completion of milking do not delay in carrying out this important work, which will, if properly performed, materially assist in producing high-grade milk.

Turn off the air tap in each bail. Start at the end bail and clean adhering particles of dirt from the outside of the cups and claws so as to prevent the dirt entering the flushing water. Then thoroughly flush each unit in turn by drawing through it at least half a bucket of cold water, dipping the cups in and out of the water so as to draw in air during the flushing. A thorough flushing out with cold water will remove traces of milk and grease from the rubber teat cups, pipes, releaser, &c. Always use cold water for this flushing. On no account should hot water be used, as it will tend to cause casein to become caked on the inside of the pipes. Scalding water at a temperature of at least 180 deg. Fahr., to which may be added one tablespoonful of washing soda to every 2 gallons, should then be drawn through the cups and pipes, care being taken to admit the water slowly at first in order to gradually heat the sight glass so as to prevent its breakage. Thoroughly clean the milk pipe line by means of the brush supplied with the machine, and according to instructions. The air pipes and vacuum tank, which frequently become foul owing to milk vapours entering and condensing in them, should be regularly cleansed and sterilised with boiling water. With machines in which water can be drawn through the air pipes by means of the vacuum pump, care should be taken not to flood the vacuum pan, thereby causing the water to get into the pump. The sterilisation of dairy appliances and equipment is most effectively and economically done by boiling water, and where it can be utilised nothing is usually gained by the addition of chemical disinfectants. When the cleansing of the piping is completed, open all taps and leave the pump running for a few minutes to dry out the pipe line. This assists in keeping the plant in a sanitary condition. Leave all pipes open when the plant is not in use, so as to allow the air to circulate through the system. The releaser should be detached, thoroughly cleansed, and allowed to dry.

## Cleansing the Teat Cups.

When the flushing out of the machine as described has been completed, remove the teat cups and rubber connections. Dissemble the cups, and carefully brush the cups and claws with a dairy scrubbing brush. This should be done in hot water in which soda or a cleansing powder has been dissolved. It is essential to remove all grease in the first flushing and to then brush and cleanse the rubbers. If the rubber inflations have not been thoroughly cleansed they will be sticky to the touch, which is an indication of a film of grease on the rubber. The surface of a well-cleansed rubber will cling when the finger is rubbed along it. Careless cleansing will allow the grease to penetrate the surface of the rubber to the extent that it cannot be scoured out, and the rubber will perish. Rubbers so affected should be discarded. Careless cleansing of the inside of the teat cup cases gives rise to corrosion and pitting of the surface. Where cups have screw caps the cleansing of the threads should receive attention, and a slight smear of vaseline applied to threaded parts will assist in keeping them in good order. The dissembling and cleansing of cups and claws should be done as frequently as possible and not less than three times a week.

Cups and rubbers, after being cleansed, may be either left in an antiseptic solution or may be dipped in same for fifteen to twenty minutes, then removed and

placed in a suitable receptacle in a cool place, away from the light, and protected from flies and dust. The vessel in which the disinfecting solution is held must be large enough to allow the teat cups and rubbers being immersed in the solution without doubling the rubber tubes in a manner to prevent the complete displacement of air by the disinfecting solution.

Several solutions for dipping or soaking the cups and rubbers are recommended by manufacturers of the different milking plants, and include chlorine compounds, lime water and permanganate of potash, and brine solutions.

Special attention is drawn to the necessity of removing all traces of the solution that may be used for the sterilisation of the cups, rubbers, pipes, &c., that come in contact with milk, before the machine is again used. This is done by flushing each unit with sufficient hot water to effectively remove any trace of the solution before commencing to milk.

Many dairymen object to very hot water for cleansing rubber, believing that the rubber is destroyed. The judicious use of hot water will do no harm to rubber, provided that all grease is removed from the rubber before the hot water is applied. Rubber, if kept in water for ten to twenty minutes at a temperature of 165 to 175 deg., will be unharmed by the heat, and most bacteria which detrimentally affect milk will be destroyed. If the rubber is placed in water at a temperature of from 180 to 190 deg. Fahr. long enough only for the surface of the rubber to be heated to the same temperature, the same object will be attained without injury to the rubber.

### Lime a Suitable Disinfectant.

An efficient disinfecting solution is made by adding two pounds of quicklime to ten gallons of water. Stir well and allow the solution to settle. Pour off the clear liquid and immerse teat cups and rubbers in it for a period of fifteen to twenty minutes.

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## THE CULT OF THE COLT.

"By "U 9 L."*

IX.

### KICKING AND OTHER BAD HABITS.

This colt we're handling now seems possessed of all the imps of perversity. It won't do anything right, and so far as it lies within its power it seeks to annoy us. Lately, and since we've been buckling the girths on it, the brute's adopted a habit of cow-kicking. That's a low-down trick, and it's one only to be expected of a base-born caitiff such as this. Apart from everything else it's a breach of good manners. Sometimes, rarely, a stick isn't a bad idea. And other times, mainly, a stick is only an inducement to continue the malpractice. That sort of thing has just to be overcome by custom, by familiarity and by teaching the thing that we're not hurting him intentionally. In that way do we curb his ulterior ambitions, and always, with any sort of a colt at all, must we restrain our own baser motives.

### Punishment a Last Resource.

Kicking, striking and biting all come within the same category. A man needs to be a jolly good judge of equine temperament to know whether a stick's going to be efficacious or not, and if he muddles the job at all it only makes the offence more aggravated and of a greater hair-trigger disposition. Leave punishment alone till all else has failed. As a last resource, perhaps, it may be useful to tie up one fore leg. You just double the leg and put a saddle strap round it. It looks a fragile tie and one on which a man wouldn't place much reliance. But it's safe as a bank. Most horses on three legs have to stay on those three legs to preserve their balance at all. That means they can't kick. That is the time for a man to move about them and to get familiar with them. Sometimes, odd times, a man may cure a devil in that way. At other times the cunning brute merely waits for the odd leg to be released before recommencing its tricks, and again odd ones are able to balance temporarily on two legs and use the other as a means of offence. The whole

* In the "Pastoral Review" for January, 1929. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, March, and April (1929) Journals, from the February, April, May, July, September, October, and December (1928) numbers of the "Pastoral Review."

thing is a ticklish job, and no fitting remedy may be recommended without a diagnosis of the colt's temper. That entails a personal inspection, which isn't possible through the keys of a typewriter.

### When a Rider wants Springs in his Boots.

Another fiendish aggravation which this horse adopts is that of refusing to stand when we go to mount. We're supposing we're man enough to be able to mount the thing even while it's in the process of going through the ring of the bit, if need be. But that's not good breaking. This colt has to stand while we clamber on him, and he's got to be steady enough for the oldest boundary-rider to mount before he leaves our hands.

"Rein him up and make him stand" is the advice given. "Pull his head round on to his shoulder and hold him." That, and sundry other advices are handed out free and regular. And they're no good! If a colt's head has to be pulled round to his shoulder to make him stand he always looks for it. If it's not done then he takes advantage of that omission, and a rider has to have springs in his boots to mount him. Don't pull a horse's head round, that's my advice. Hold him with a reasonable degree of firmness, by all means, but don't make a contortionist of the horse when you go to mount him. If you have the ability to mount him steady and without fuss you'll find that the colt will reciprocate. He'll steady down with custom, and provided you don't make a mull of any mount he'll come to his senses and your notions in no time.

### The Best Position for Mounting.

As always, the best position when about to mount a touchy colt is right in close to him. Keep your own body pressed against him, your knee in his shoulder, and above all see to it that you keep in close all the time you're in the air and that your right arm is bent at the elbow. That's the big point: that crooked elbow. That gives you command of position and elasticity of action.

Though I haven't referred to "lugging" a colt, that advice is almost sure to be handed you. And however vehemently the advice is tendered, I as emphatically say No! It makes the colt stand—that's admitted—and in that motionless position you may climb on in comfort. You can't! Apart from that, it's only teaching the thing bad manners. It's making it touchy about the ears it's teaching it that it may only be mounted when "lugged," and the day isn't too far distant when that colt is going to refuse to allow you to catch hold of its ear. In fact, it's going to be a dickens of a job to get the bridle over its head at all, That's what's going to happen.

### Don't Rush the Mounting Process.

If you have the necessary length of limb and the agility to indulge in lugging, why not adopt a better and more harmless method of achieving your purpose? This is it. You have the colt reined ready to mount, and as you lift your foot to put it in the iron that colt commences to wriggle in preparation for a bound, and perhaps it takes a step forward. Don't put your foot in the iron. Instead of doing that follow another course. Drop your left hand from the crest of the horse's neck and put it round quickly under his neck at the point where that neck joins the chest. Gather a bit of loose skin there and hold it firmly in your clenched hand. That makes the brute stand without the application of undue force and easily. In fact you may mount him from that position and he'll not move during the process. But it's risky, though it has been done, and I maintain that the recovery from that position is little more difficult that from the lugging position. Anyway, if you do that several and sundry times when about to mount you'll find that the colt responds quickly and in next to no time he'll stand while you mount. But please don't rush the mounting process. Nothing is more conducive to a colt's uneasiness than a hurried mount. It can be done almost as quickly, twice as safely, and better in every way if there's no hurried haste.

### Man and his Mannerisms.

At about this stage I'd like to repeat that a horse, particularly a colt, gathers its own mannerisms from the man who's handling it. Later on in life, when the thing's older and more set, it borrows something of the mentality of the man who regularly rides it, but in its stage of educational infancy it's quick to pick up notions and habits from the man who's teaching it. I point that out, not necessarily that a man may make use of it to his own benefit, but so that a breaker may understand it's better and more fitting that he curbs his temper and always preserves an even amiability towards his charges.

If, in any of your actions—mounting or anything else—you give the colt an impression that you're nervous about it, then as sure as eggs that colt will be fearful in the same operation. If you rush your mount, so will the colt try and make a lightning process of it; if you shirk any risk, so will the colt take advantage of that timidity; and in a hundred and a dozen ways it is right that the breaker should meet his colts with an even temper and without fear—a feeling of comradeship is, perhaps the best way to explain it.

We're done with this sour-tempered brute now. Of course, there are dozens of little faults and foibles which I've omitted. To deal with them all in detail would be an endless task, and anyway, the whole thing is distasteful. Though a breaker may not be able to make a horse of the thing, at least he knows he's not spoiling one—it could never be a horse worthy of the name. I'll deal later with sundry little tricks which may help to overcome fractiousness, but as they would apply equally to all sorts of horses, I'll leave them for the time being and now refer to the very important part of riding.

## BUCKJUMPERS.

Horses don't buck like they used to. We'll take all that as read. If we doubt it we can get confirmation from many greybeards, and at least their word is worthy of respect.

Even so, in more or less recent times I've known 'em switch their tails in an offensive manner. I'll agree, however, with anyone that not one per cent. of so-called buckjumpers can buck. In the vast majority of cases that bucking is only rooting, and the rest is built on imagination and inexperience. Still, odd ones do.

The big question before the council is: Should or should not a buckjumper be flogged. This refers to the breaking, of course. Rather it applies to the riding after the first spell, and when the horse has learned to balance his load. Some men can do it, and they like to do it. Others have a notion that they'd like to do it, and their attempt ends in disaster. That's bad for the colt, and it doesn't benefit the man. My idea is that if a colt likes to go steady then by all means let him proceed evenly, and if he bucks properly then I'm so fully occupied usually I haven't time to think of anything else. Apart from everything else, and whether a man's able or not to do it, it's a question of judgment of character—psychology is the word, isn't it?

### When "Pronging" the Pigskin.

If you take a colt steadily, soothingly, and if you treat him in a brotherly fashion, and he will persist in putting his head down and cutting capers, what about it then? It depends entirely on what prompted that outburst. It may be fear, it may be that the thing's uncomfortable, it may be a little display of animal spirits, and it may be vice. For the first three I'd enter into the spirit of the thing and mix it mentally with the colt while he indulged his whims, and for the last I'd pour the mop into him good and plenty, soaking him till he cried crack, and then hand him some more for good measure. Mind you, it may be wrong, and it might only add to the colt's bad temper. But if the display is prompted by vice then I maintain there's no harm done. It will grow worse itself if let alone, and there is a chance of nipping that evil in the bud. There's a don't attached to this, of course: Don't get thrown. If you're tossed then you've taught that horse a bad example which is going to take much erasing, and you've landed yourself in a dickens of a mess—if you're a man at all you're the one who's going to rectify that error.

### Riding a Rough 'un.

Riding a buckjumper is easy—to some people. I've known two—no, three—men to whom it was a natural gift. To the rest of us the art is acquired with much practice, with many pains—like genius—and with stiff limbs and sweat of blood. And then, once you've got there, you must keep in practice. The art of the whole thing is in anticipation—you think just one shutter-click of time ahead of the horse what he is going to do next, and you anticipate that move in readiness for it. That's all. One of the gifted riders to whom I refer—the third—explained it slightly differently. He stated that the rider lost a certain amount of ground, or position, with every leap of the buck, and that he regained that lost position, and a bit more, every time the horse hit the ground. That's easy, too, to gifted horsemen. A breaker must be able to ride, of course, and as I've stressed from the beginning he must be in mental accord with his horse and know when and where not to do things. There you have it in a nutshell whether a buckjumper should or should not be flogged.

# Answers to Correspondents.

## BOTANY.

*From the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.*

### Queensland Kauri—American Redwood.

T.A.P. (Toowoomba)—

Your specimen is the Queensland Kauri, *Agathis robusta*. The New Zealand plant has much smaller leaves than ours. The leaves on coppice shoots or on young trees in the New Zealand plant are very much narrower than in our species. There is no doubt about the determination. The germination is generally poor in Queensland Kauri, especially in the seeds from cultivated trees.

We do not know how you will succeed with American Redwoods. The only place we think where this tree will do will be in the highlands of South-Eastern Australia. We have seen trees at Ballarat, but on the whole it does not seem to do as well as its sister species, the Giant Tree or Big Tree, *Sequoia gigantea*. It is, however, generally regarded as being very much superior as lumber.

### Carpet Grass.

S.F.W. (Upper Coomera)—

The sample of grass forwarded by you is *Paspalum platycaule*, the Carpet Grass, a native of the warmer parts of America, but now widely spread over the tropical and sub-tropical regions of the globe. It is very common in North Queensland, and less so in the South and the Northern Rivers of New South Wales. It has rather a mixed reputation as a fodder, but for good soils is not equal to the ordinary *Paspalum*. For poorer soils where the common *Paspalum* does not do too well, it is a useful grass.

### Yellow Oleander—A Poisonous Plant.

H. (Rosalie)—

Your specimen is *Thevetia neriifolia*, sometimes known as the Yellow Oleander, a native of South America and the West Indies, cultivated in warm, temperate, and sub-tropical countries as an ornamental shrub. All parts of the plant are poisonous, and on this account the shrub is a dangerous one to have growing where there are young children.

### Tree Groundsel.

A.M.R. (D'Aguilar)—

Your specimen forwarded is *Baccharis halimifolia*, the Tree Groundsel. An article on this plant was published in this Journal for July, 1923. The plant is a very strong grower, and on this account we are doubtful about the efficacy of arsenical sprays, though, if repeated several times, it may be killed. Grubbing out the bushes seems to be the only satisfactory method of extermination.

### Leopard Flower—Wild Marjoram.

G.H.J. (South Brisbane)—

Your specimen is *Bellancanda chinensis*, or sometimes known as *Pardanthus chinensis*, the Leopard Flower, a tall-growing plant of the Iris family—Iridaceæ—a native of China.

The other plant you refer to is *Ocimum sanctum*, sometimes known in North Queensland as Wild Marjoram, and used by bushmen as a tonic, being taken in the form of a tea. This plant is fairly common in parts of the Gulf country, but the handiest place we have it recorded for in quantity is Charters Towers and it is said to be fairly common there. If you know any chemist at Charters Towers he should be able to put you in the way of getting a fair supply at the present time. It is a Labiate, about 2 feet high, the leaves rather greyish-green, with a strong "labiate" smell.

### Central Queensland Plants Identified.

M.L.F. (Dalma, via Rockhampton)—

1. *Sterculia rupestris*, the Bottle Tree.
2. *Sterculia trichosiphon*, the broad-leaved Bottle Tree. This is sometimes called Kurrajong in Central Queensland, though the name Kurrajong, strictly speaking, belongs to another and closely related tree.
3. *Setaria macrostachya*, Scrub Panicum.
4. *Ajuga australis*, Australian Bugle.
5. *Hibiscus trionum*, the Bladder Ketmia. This is a native species of Hibiscus, widely spread over the warm temperate parts of the world. It is very common in some parts of Western Queensland on the black soil plains. It is rather a pretty little plant in flower.
6. *Indigofera hirsuta*, Hairy Indigo. Sometimes called Wild Lucerne, but this is a name applied to several leguminous plants in Queensland.

We shall always be pleased to name and report on any specimens or plants you care to send. The local names in use in your district are very acceptable.

### Batswing Coral—Honey Locust.

S.R. (Maryborough)—

1. *Erythrina verpertillia*, the Batswing Coral, so called owing to the shape of the leaflets. It is a native tree with a wide distribution in Queensland, occurring both on the coast and inland. The bark is thick and corky and the wood is exceptionally light, hence the tree is often known as Corkwood. This name, however, is applied to a number of trees in Queensland with rather light woods and soft, corky barks.
2. *Gleditschia triacanthos*, the Honey Locust. A native of North America, much planted in temperate and sub-tropical countries as an ornamental tree. The large pods it yields have considerable value as fodder for stock. The flowers have considerable value for honey-producing purposes.

### Love-in-a-Mist Passion Vine—Cockatoo Apple—A Native Grape Vine.

W.M.P. (Murray's Creek, N.C.L.)—

1. *Passiflora foetida*, Love-in-a-mist Passion Vine. A native of South America, now widely spread over the tropics and sub-tropics of the world. The ripe fruits are often eaten by children, but when unripe they are dangerous as they contain a prussic acid-yielding glucoside. The plant has been widely cultivated in tropical countries as a green manure and smother crop, being largely grown in some tropical places under rubber trees to smother out more vigorous and rank-growing weeds.
2. *Careya australis*, the Cockatoo Apple. This plant is very common in coastal Queensland from Wide Bay northwards, and extends up to New Guinea. It has been looked upon as harbouring the fruit fly, but the fly contained in it is a different one from the species that infests cultivated fruits. You call it Kangaroo Apple. This name more correctly belongs to another plant—*Solanum aviculare*—but local names change a good deal according to the district.
3. *Vitis opaca*, a native Grape Vine. The roots sometimes form large underground tubers, but we do not know if these have any food value.

### Cassia and India Rubber Vine.

F.R.D. (Barcaldine)—

The shrub is *Cassia notabilis*, a plant of the Senna family. It is not known to be poisonous to stock, but they do not seem to eat it. If they did, like others of the same genus, it would probably be a purgative. The present species has not come under notice as a pest, but many Cassias are capable of overrunning the country if left unchecked. We previously received specimens of this plant from you in the spring of 1927.

The plant with the curious double seed-pod is *Cryptostegia grandiflora*, an india-rubber vine. A pamphlet on it has been forwarded.

**Burr Vine.**

H.P. (Stanthorpe)—

The specimen is *Carissa ovata*, commonly known in Western Queensland as a Burr Vine; not a particularly good name, as the plant is hardly a vine but a shrub. Berry Bush is another name applied to it. It has some reputation as a fodder in spite of its thorny nature. It should be possible to grow it in the Stanthorpe district, but in its natural state it generally seeks the shelter of native scrub. The plant is propagated from seeds, which, if we remember rightly, set some time in the winter months.

## PIG RAISING.

*From the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton.*

**Sick Pigs.**

E.B. (Mallanganee, N.S.W.)—

The pigs are suffering from infection by stomach and intestinal worms, as well as from severe indigestion and malnutrition, all the result of improper feeding, and by exposure.

The fact that these pigs do very well until they are about three months of age shows that this is the period during which they receive a liberal supply of natural food from the sow, but when this supply is cut off and the diet is changed, indigestion is set up and the resultant disorders check growth and produce the pot-bellied, slow-growing stock to which you refer.

These matters are treated very fully in a number of pamphlets we are posting to you under separate cover, so we need not refer to them fully here, but would add that every effort should be made to accustom the young pigs before weaning to the same class of food as that on which they will have to depend after weaning. If this is done there will not be any serious check in growth at weaning time.

Infestation by these worms results from the young pigs picking up the worm eggs while suckling; the worms develop rapidly in the young animal and soon cause a serious check in development. See reference to treatment in pamphlet on "Paralysis in the Hindquarters." See also leaflet "Diarrhœa or White Scour in Young Pigs," for this treats also on constipation, from which it is evident your pigs are suffering.

We strongly recommend you to try some protein meal and some bone meal and lime water in the food given to these young pigs and see also that they have their food in a quiet corner where they can feed without disturbance by older stock, as they are too young to be able to successfully fight against older stock in the rush for food. Succulent greens and an abundant supply of clean drinking water are essential to the rearing of young pigs, while balanced rations only should be fed. See pamphlets also for treatment of skin parasites, for it is possible the young pigs may be infested with hog lice.

**Pig Standards.**

P.G.R. (Goodger, Nanango Railway)—

At the several meetings of the Queensland Pig Industry Committee the matter of a standard carcase of pig most suitable for the local bacon trade has been dealt with

The ideal bacon pig as required by factories and the trade in this State is a prime quality, medium condition, fleshy animal not exceeding six months of age and from 95 to 120 lb. weight dressed, approximately 136 to 170 lb. live weight. There is no market for very heavy, fat pigs or for pigs in an overfat condition even if they are of correct weight and type. Hence the greatest care must be taken in having bacon pigs in prime condition and not over the specified weights.

From the copy of the February issue of the "Queensland Agricultural Journal" forwarded with other pamphlets under separate cover, you will note the scale of weights and current prices being paid for bacon pigs in this State and remarks thereon, and we hope you will bring these matters before your members and urge all those who are not already subscribers to the "Queensland Agricultural Journal" to send along their shillings (it costs the farmer only a shilling a year for postage) and have the Journal posted regularly. Copies of the article dealing with the Economic Phases of the Pig Industry are being sent to every known pig producer through the various butter factory organisations, but if any of your members are not dairying and should like a copy of the pamphlet, we shall be glad to supply it.

## Bacon Curing on the Farm.

L.P.A. (Bouldercombe, Rockhampton)—

The secrets of success in the curing of bacon are:—

(1) The correct weight, type and condition of the bacon pig.
(2) Correct preparation for slaughter by restricting the feeding and resting the animal twenty-four hours beforehand.
(3) Absolute cleanliness and complete control of temperature throughout the process of curing.

The reason the factories can successfully cure bacon and ham without the necessity of removing the shoulderblade and opening up the stifle joint in the ham is that they are able to thoroughly chill the carcase after having allowed the animal heat to pass off. They also have complete control of the temperature both day and night, week in and week out, and can thus keep the meat in temperature of around 42 degrees Fahr. during the whole of the time it is in the curing cellars. They also have proper rooms for thoroughly drying the meat preparatory to and for smoking after the drying process is complete.

The trouble with curing bacon on the farm, especially in warm climates, is that the temperature varies so much from day to day and from morning to evening that it is not possible to check decomposition to the same extent as it is where continuously low temperatures prevail, as they do in the factory cool rooms. We doubt very much whether it pays farmers to attempt the curing of their own bacon, unless they have specially constructed cellars or rooms where there is a continuous draft of cold moist air, for moisture is as essential to success as low temperature.

If your members clubbed together and sent in a consignment of suitable pigs to the bacon factory either at Rockhampton or Maryborough or other centre, we feel sure the factory management would willingly undertake at your risk the curing and final delivery of the products of these pigs, charging working expenses only on the consignment; at any rate it would be worth enquiring into. You will realise the factory people are not very keen on the matter of curing for individual shareholders as it means too much expense in handling each man's bacon and they do not consider the resultant bacon would be any better than the average bacon, ham, etc., manufactured at their factory and which is available to shareholders at wholesale rates in sides, flitches, middles or hams.

We shall be glad to advise you fully on any other points on which your members require detailed advice.

Salt, sugar, and saltpetre are the best perservatives to use in the curing of bacon. The use of boric acid or commercial preservatives is not generally recommended; in fact, for British markets and oversea trade the use of preservatives like boric acid is strictly prohibited. Preservatives like this will not check decomposition unless the temperature of the room in which the meat is cured (or of the brine) is low enough; in fact, they are only of value under conditions favourable to the curing of bacon without the addition of these acids.

## Sunflower Seed for Pigs.

"Inquirer" (Brisbane)—

Regarding the use of sunflower seed as a food for pigs, and our suggestion that a very limited proportion of seed—2 per cent. or so—should be added to the ration, it might be as well to point out that a larger proportion of seed, up to 10 per cent., could be used without materially affecting the growth of the young stock. Both the seed and the plant itself are looked upon by authorities here and in other parts of the world as of lower food value than maize, or the better grades of sorghum, and it is quite apparent that it would not pay to grow sunflowers specially for stock feeding purposes. One American report indicates that equal parts of corn and sunflower seed were fed to pigs in conjunction with other foods with good results, but there does not appear to be any clear indication as to the nature of the other foods or the relative proportion. Another report states that sunflower seed may be classified as of similar value to linseed, but here, again, it is very doubtful whether it would pay to grow linseed as a stock food unless the grower was prepared to experiment and take his chance with the results. In his "Stock Foods" pamphlet, Mr. Brunnich, the Agricultural Chemist, states that sunflower seeds and sunflower oil cake, if procurable, are excellent foods suitable for all kinds of stock.

# General Notes.

### Examinations under "The y Produce Act of 1920."

July 13th has been fixed for the holding of the annual examinations in the theory of Milk and Cream Testing, Milk and Cream Grading, and Butter and Cheese Making. These examinations were held previously during the months of October or November.

### Watering Horses.

Horses require anything from 5 to 15 gallons of water a day, the quantity depending on the temperature and the amount of work performed. The water should be as pure as possible, clear in appearance, and free from taste, colour, or smell.

Pure water is just as essential to a horse as it is to a man, and it is a mistake to suppose that a horse can drink badly-contaminated water with impunity. Water obtained from pools or shallow wells, contaminated with surface drainage, or containing decomposing organic matter, frequently causes diarrhœa, and generally predisposes to colic. Water that contains a large amount of sediment should not be given, as the sediment causes a mechanical irritation of the mucous membrane of the stomach and intestines—i.e., sand colic. When the horse is at rest in the stable, water should be given three times a day, and should invariably be given previous to feeding.

### Staff Changes and Appointments.

The following appointments have been made in the Agricultural Bank:—

Mr. E. W. Everett, Inspector, to be Senior Inspector, and the undermentioned Inspectors to be District Inspectors:—Messrs. A. Harrison, J. F. Smith, G. H. B. Watson, W. S. Robinson, R. J. Calder, C. S. Ross, and E. W. Wanstall.

These appointments will take effect as from 1st May, 1929.

The appointments of Messrs. S. A. Green and D. McLaurin as Inspectors under the Diseases in Plants Acts have been confirmed as from 1st November, 1928.

The appointments of Messrs. S. G. Allan and J. A. Kerr as Inspectors under the Diseases in Stock Act have been confirmed as from 30th October, 1928.

The appointment of Mr. F. C. Coleman as Inspector under the Dairy Produce Act has been confirmed as from 15th October, 1928.

Mr. F. C. Shaw has been appointed Temporary Inspector of Stock, Maryborough, from 2nd April, 1929, to 27th April, 1929.

The resignation of Mr. L. L. Gudge, as Cotton Classer and Salesman, as from the 6th March, 1929, has been accepted as tendered.

### Honey Board Election.

The first election in connection with the appointment of four growers' representatives on the newly constituted Honey Board resulted as follows:—

| | Votes. |
|---|---|
| H. E. Fagg, Killarney South | 222 |
| E. Pickering, Eumundi | 210 |
| R. V. Woodrow, Woodford | 200 |
| J. Schutt, Holstein Park, via Dalby | 179 |
| H. L. Jones, Goodna | 168 |
| A. Gambling, Raceview, via Ipswich | 82 |
| H. E. Golder, Milmerran | 74 |
| J. T. Biggs, Caboolture | 64 |
| J. M. Petersen, Morayfield | 64 |
| M. Peake, The Gap | 42 |
| A. F. Spry, Clayfield | 30 |
| C. F. Spry, Rocklea | 24 |

Messrs. Fagg, Pickering, Woodrow, and Schutt, together with the Director of Marketing, will therefore be appointed members of the Board, and will hold office for a term of one year.

### Wheat Board Referendum.

A poll to decide whether the State Wheat Board should be brought under the provisions of "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1928," or remain as at present under "*The Wheat Pool Acts*, 1920 *to* 1925," was conducted on the 22nd April. The voting was as follows:—

| | |
|---|---|
| For the proposal to declare wheat a commodity under the Primary Producers' Organisation and Marketing Acts .. .. .. | 622 votes. |
| Against the proposal to declare wheat a commodity under the Primary Prducers' Organisation and Marketing Acts .. .. | 867 votes. |

The proposal will consequently lapse.

### "ABC of Queensland and Australian Statistics."

The Registrar-General (Mr. Geo. Porter) has forwarded us a copy of the 1929 Edition of his "ABC of Queensland and Australian Statistics." This book contains a wealth of statistical and other information, but at the same time is of a handy size and easily carried in the pocket.

Besides presenting statistical facts in an interesting and useful form, it contains much general information which will prove useful to almost any class of person. For instance, there are among other things Location of Public Offices; Consular Representatives; Registrar-General and Registrar of Friendly Societies' Fees; Public Curator Fees; Fees under Real Property Act; State Duties; License Fees (State and Federal) including Customs, Fishing, Timber, Traffic, Wireless, Wine, Beer, and Spirits, and others; Company, Shop and Factory Registration Fees; Federal and State taxation information; Main Roads Regulations and Fees; Post Office Charges, &c.

New statistical features have been added this year touching on topics of general interest, such as—Area, Yield and Value of Australian Fruit Production, Oversea Trade, Value of Production, Greater Brisbane Finance, Oil Boring Companies, Industrial Accidents, Membership of Industrial Organisations, Unemployment, Census Population and Expectation of Life. At the same time the volume retains all of the features incorporated in previous issues, and all figures quoted were the latest available at time of going to press. A map and geography of Queensland, a graph showing Principal Agricultural Yields, and information concerning world population and products are included, besides Statistical Tables giving facts concerning Agriculture, Live Stock, Land Settlement and Tenure, Banking, Building, Local Government, Manufacturing, Retail and Wholesale Prices, Cost of Living, Purchasing Power of Money, Rates of Wages, Industrial Courts, Industrial Disputes, Education, Election Results, Public Finance, Taxation, Friendly Societies, Hospitals, Life Insurance, Law and Crime, Local Option Polls, Meteorology, Mineral Production, State Enterprises, Trade, Shipping, Motor Vehicles, Post and Telegraphs, Wireless, Railways and Tramways, Traffic Accidents, Births, Deaths, Marriages, Divorces, Infant Mortality, Population, and Migration. This book should be of real interest to all.

### Wheat-growing Competitions—Factors in Increased Yields.

Frequent and judicious working of the fallows, coupled with liberal use of graded seed and superphosphate, are the factors largely contributing to the increased yields in the various crop competitions in the Parkes (N.S.W.) and adjacent centres, according to the judges' summarised report.

In 1926, it is stated, the fallows producing the leading seven crops and the twelve supplementary crops were worked 6.6 and 4.75 times, respectively, an increase of 1.85. In 1927, the times worked were 8.4 and 4.9, an increase of 3.5 times, and this year (1928) 9 and 6.6 times, an increase of 2.4 times. The average number of workings in 1928 was greater than in 1927 or 1926.

The use of superphosphate shows a continued increase, the amount being 73 lb. per acre, for the leading seven crops of 1928. There has been no increase in the amount of seed sown, which is still about 1 bushel per acre.

It is noticeable, remark the judges, that diseases are becoming less menacing under scientific farming. In the central-western district this year flag smut was the only disease at all prominent. Foot rot and take-all were not much in evidence, while copper carbonate has effectively controlled bunt. Almost without exception this season the seed was treated with copper carbonate. How this treatment of seed wheat has grown in favour in recent years is well demonstrated by statistical records, which show that in 1924 only 40 per cent. of the competition crops were so treated, while in 1928 the percentage had increased to 97.

**Egg Board Levy.**

Regulations have received approval under "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1928,*" empowering the Egg Board to make a levy on all persons delivering eggs to such Board, the levy to be at the rate of ½d. per dozen eggs so delivered as from 1st January, 1929, to 31st December, 1933. This levy is to be used by the Egg Board for administrative purposes.

**Getting Land Ready for Fruit Trees.**

Preparation of the land for planting of fruit trees should be painstaking and thorough. Ploughing must be to a sufficient depth, sufficiently depending upon the nature and depth of the soil and the nature of the subsoil. The soil should be thoroughly broken up, and allowed to remain in the rough, so that, exposed to the beneficial influences of sun, rain, air, and frost, it may be sweetened and improved in its chemical content, and so that it may absorb and hold the winter rains. Later, as a result of the influences referred to, it will respond to the orchardist's efforts to induce a good tilth.

In localities where autumn is mild and frosts during that season are unknown, citrus trees may be planted during the month of April. Injury to roots and the drying of the roots during the process of planting should be avoided. It will be necessary to water newly-planted trees in dry soil, thus helping them over the critical period of establishment in their new position. Loss of soil moisture is lessened by the beneficial process of mulching. Do not place undecomposed manure in contact with the roots. Manure, if used at the time of planting, should be thoroughly mixed with the soil. When refills are being planted a large hole should be dug and filled with fresh soil.

**Common Cream Defects—Causes and Remedies.**

How to guard against the defects commonly found in cream is a matter of considerable financial importance to the dairy farmer. In the following paragraphs are discussed a few of such common faults, their causes and remedies.

*Over-ripe Cream.*—This is caused by the cream developing excess acidity, by skimming cream too thin, or by infrequent deliveries to the factory. Do not skim cream below 40 per cent. test in spring and summer, or below 36 per cent. test in autumn and winter. Cool and crate cream on the farm. Deliver to the factory frequently—not less than four times weekly.

*Staleness.*—Caused by holding cream too long at the dairy. Often the balance after filling the cream can is held until the next delivery, and held at too high a temperature. The remedies are to send all the cream in the dairy on days of delivery, and to keep creams cool while on the farm.

*Ropy Cream.*—Due chiefly to bacteria in water supplies, especially in swamps, stagnant dams, &c.; also due to unclean, dusty yards and bails, dairies and utensils. Cows should be prevented from wading in stagnant waters, and the udders of the cows should be washed and wiped before milking. Premises and utensils should be kept clean. This defect is very difficult to overcome, unless clean methods generally are adopted in dairy work. Use soda when washing utensils, and boiling water to scald all utensils. At least once a day remove all cow droppings 100 feet from dairy, yards, and bails.

*Curdy Cream.*—Due to skimming cream too thin, to keeping cream at high temperatures, or to adding warm cream to cool cream. Skim cream from 38 per cent. to 42 per cent. fat test. Keep cream cool. Mix warm cream with cool cream only after animal heat has been reduced; give the whole an occasional stir to make the mass uniform, and stir at least four times daily.

*Fermented Cream.*—Due to the development of bacteria, mostly the result of unclean methods in dairy work. To remedy the condition give strict attention to cleanliness in plant and premises, using boiling water mornings and evenings, and see that the udders of the cows and the hands of milkers are washed. Skim the cream not less than 38 per cent. test, and mix creams only at cool temperatures.

*Cowy Flavour.*—Due to unclean condition of bails and yards, especially in wet weather; also to milking unhealthy cows, and milking cows too soon after calving. Cleanliness of bails and yards should be the order of the day. Never use milk from sick cows, or from cows too soon after calving.

*Rancid Cream.*—Due to over-staleness, the result of not delivering to the factory frequently enough. This class of cream is liable to be condemned, being unfit to manufacture into butter. Cleanliness must be observed, with frequent delivery to the factory.

### Clean up of Vegetable Plots.

Clean cultivation is of considerable significance in the combat of the various pests of field, garden, and orchard.

It is an important factory in the control of cabbage moth, for instance, and one that cannot be too strongly emphasised. It is often the practice to leave all unsaleable cabbages or cauliflowers, or the stumps from which the "heads" have been cut, in the ground long after the crop has been harvested. This provides a continuous breeding ground for the moths, which infest the young plants as soon as they are put out—very often alongside the abandoned plot. All useless plants and stumps should, therefore, be cleaned up and properly destroyed as soon as the crop is harvested.

The same reminder may be given with respect to the pumpkin beetle, a pest so prevalent this season. A few years ago it was discovered that the larvæ of this beetle infest the roots of pumpkins. All dead pumpkin and melon plants, therefore, should be cleaned up and burnt.

### The Royal Society of Queensland—Report of Council for 1928.

Thirteen original papers were read before the Society and published during the year. Three public meetings were held. On 10th July, 1928, Dr. C. M. Yonge, leader of the Great Barrier Reef Expedition, Dr. Stephenson, and Messrs. Tandy and Russell outlined the work contemplated. On 16th July, 1928, Sir Arnold Theiler gave an address on "Problems of Phosphorus Deficiency of Stock." On 4th March, 1929, Professor Johannes Schmidt, D.Sc., Ph.D., Director of the Carlsberg Laboratory, Copenhagen, and leader of the Danish Oceanographical Expedition, delivered a lecture on the life history of the eel.

The Council wishes to acknowledge generous subsidies amounting to £147 from the Queensland Government towards the cost of printing the Proceedings of the Society. Appreciative acknowledgment is also made to the University of Queensland for housing the library and providing accommodation for meetings.

The membership roll consists of 4 corresponding members, 6 life members, and 176 ordinary members. During the year there were five resignations, and nine new members were elected. The deaths of Dr. J. V. Danes, of the Czech University, Prague, a corresponding member, and of Mr. W. R. Colledge, a past president of the Society and a frequent contributor to the proceedings, are reported with regret. Mr. Rowland Illidge, a former honorary librarian of the Society, has been lost from the ranks of Queensland biologists by death.

### Green Coloration in Wool—Investigations into Cause.

Though distinctly uncommon, it is not a very rare thing to see wool which shows a greenish discoloration, and at times a reddish coloration has been observed. The discoloration may affect the whole length of the staple or only part, and sometimes may occur as bands across the staple (states an article in the "Agricultural Gazette" of New South Wales). It is said to be most commonly met with in wool from the tablelands, and it is understood that the wool is looked upon unfavourably by buyers owing to the colour remaining steadfast after scouring.

Recently a sample from the Monaro district was submitted to Glenfield Veterinary Research Station for examination, and as a result it was possible to confirm a previous observation that the production of colour was due to the growth of a pigment-producing bacterium. Not only was the bacterium readily cultivated from the sample in question, but the condition has been reproduced experimentally on the back of sheep.

It was found that the bacterium in question requires a considerable amount of moisture for its growth, and appears to grow better on fine than on coarse wool. When very old, the colour turns a brownish red, but the green colour can be restored by the addition of alkali, and, conversely, the green colour becomes red on the addition of acid. It would thus appear that if there happens to be an acid-producing organism, the wool may take on a red colour. Thus both types of discoloration may be induced by the growth of the same organisms.

The green-producing bacterium is not a very uncommon organism, and at times gets into wounds, probably from dust. It would seem, therefore, that if it gets a lodgment on the skin of a sheep and the conditions are suitable for its growth, that is, if the skin is scurfy and there is sufficient moisture, it may lead to this discoloration of the wool. Such conditions might well exist at times in tableland country with heavy rainfall, and it is to be noted that it is said that the condition is seen chiefly in sheep from such localities.

**A Southern Dairy Farm Competition—Points from the Report.**

In inaugurating a dairy farm competition the Murrumbidgee Pastoral and Agricultural Association was responsible for something in the nature of an innovation in the dairying industry. Seven farms were submitted for judging, points being awarded under a schedule, the main headings of which were conservation of fodder, character of the herd, and layout of the dairy and farm. Mr. A. R. Martin, whose farm is situated on the Murrumbidgee River, about 12 miles west of Wagga, was the winner, scoring 1,115 points out of a possible 1,250. The following notes, which should be of interest to others besides those competing, are taken from the judge's report.

With reference to fodder conservation (the importance of which was so generally recognised by competitors that the average score was 230 points out of a possible 300), it is remarked that if full returns are to be obtained from dairy cows they must be well fed during the whole of the lactation period—that is, usually for about nine months after calving. If feed is scarce at any time during that period, the milk flow, and consequently the factory cheque, will decrease. In no part of New South Wales are the natural pastures sufficient for nine months on end, so that the growing of crops and the conservation of fodder are necessary if full returns are to be obtained from dairying.

The ideal fodder for dairy cows consists of a mixture of grasses and clovers in bloom, such as is found in the Wagga district in late winter and spring. This provides naturally a balanced ration; that is, one in which the different ingredients are in the proportions which can be most economically made use of by the cow. The ingredients referred to are protein, the flesh-forming substance, and carbohydrates and fat, which provide heat and energy. Protein is the most expensive ingredient of food to provide, the value of a fodder usually being judged by the quantity of protein it contains. In this respect the Wagga district is fortunate in that the basis of feeding on nearly all farms is lucerne, which contains more protein than any other common fodder.

Lucerne alone, however, does not provide a balanced ration, being deficient in carbohydrates, and it therefore requires mixing with fodder rich in carbohydrates, and the cheapest and most plentiful fodder of that nature in this district is oaten or wheaten hay or chaff. For example, if a cow were fed a ration of 30 lb. lucerne hay or 30 lb. oaten hay per day, in neither case would a balanced ration be provided, too much of certain ingredients being supplied and not enough of others. The yield therefore would suffer. But if a mixture of 15 lb. lucerne and 15 lb. oaten hay or chaff were fed a fairly well-balanced ration would be provided. This is a matter that is not very well understood, there being a tendency to feed only one fodder at a time.

The owners of all competing farms were impressed with the necessity for improving pastures, mainly by top-dressing, and to a lesser extent by the sowing of improved pasture plants, such as subterranean clover and rye grass, proceeds the report. Of green crops, lucerne, of course, always has pride of place, but many areas of Sudan grass were seen to be suffering severely from the dry weather and in some cases germination was very patchy. This makes one wonder why dairy farmers do not go to the trouble of fallowing a small area for summer fodder each year. Sudan grass is a valuable fodder, but it cannot be sown until the ground is warm, and when sown on freshly ploughed ground in a dry spring is bound to suffer severely.

As to the herds, farmers generally are stated to be keen to develop them along the right lines. The importance of a purebred bull is realised, but it is still more important, it is pointed out, that he have behind him a record for production which he will transmit to his daughters—the herd of the future. Unfortunately there are many purebred bulls whose presence in the herd is more likely to have a deteriorating than an improving effect on butter production. Unless the sire of the herd comes from tested stock whose records are known, there is no certainty that his progeny will be better than their parents as dairy animals.

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### What should Baby Weigh.

What should baby weigh? The answer to this question, so often asked by mothers, depends on many factors besides baby's age. The mother is prone to base her idea of what her child should weigh on the weight of a friend's or neighbour's baby, and she not infrequently thinks that her own infant suffers by the comparison. Because her baby is smaller, the opinion is formed that he cannot be getting sufficient food, or, what is worse, that her milk is not agreeing with him. In her anxiety that he should thrive, the mother is tempted to wean him, and give him some artificial food. Perhaps, unconsciously, her mind has been influenced by frequently seen glowing advertisements of patent foods, accompanied by photographs of big, fat babies, and the anxious mother thinks that the food which produced such results in other children must also be good for her baby. What she does not realise is that patent food-fed babies, though often very fat and heavy, are frequently flabby, and in other respects not as healthy as the child who is fed by his mother. So her baby is weaned, and deprived of the food which, above all others in the world, is best for him.

Only too often serious digestive upset follows, especially if the weaning is done during the summer months, when there is the risk, not only of upset due to changing the food, but also the danger of infection with dysentery, which occurs every summer in Queensland.

In judging what a baby should weigh, consideration should be given to more than merely weight for age. A little knowledge of some of the factors to be taken into account may save some mothers from anxiety, and some babies from being robbed of their mothers' milk.

The average baby, at birth, weighs 7 lb.; boys usually weigh a little more than girls. During the first week of life there is almost always a loss in weight, but by the time baby is a fortnight old, he has, as a rule, regained his birth weight. Sometimes it takes a little longer—perhaps three or four weeks—for him to regain this weight, and if this happens it need not cause anxiety if the infant appears well. But, at any rate, at the end of a month, the baby who fails to gain weight must be taken to a doctor or a welfare nurse. It may be that baby is getting insufficient food, or too much food, in which case the nurse will be able to help or advise, but some infants need medical attention. The average healthy baby at the end of a fortnight has regained his birth weight, and from this time on he should make steady progress. In the first three months he gains weight more rapidly than at any later period in the first year. His gain should be from 4 to 8 oz. each week. By the time he is three months old this rapid gain is slowing down a little, and the average gain for the next three months is from 4 to 6 oz. weekly. When baby is from five to six months old, he has doubled his birth weight. After that time there is again a slowing down, and from then until he is twelve months old the gain is about 1 lb. a month. At twelve months the birth weight is usually trebled, and the child weighs about 20 or 21 lb.

All these figures apply to the average normal baby, but every baby must not be expected to conform to them. There are exceptions, even among seemingly normal babies, and those who obviously differ from normal must be expected to differ from normal standard.

Take, for example, the baby who is under weight at birth. The infant who weighs, say, only five pounds, cannot be expected to gain as much weekly weight as the one who was seven pounds when born. A smaller gain would, in this case, be perfectly normal, and quite satisfactory. Baby started life weighing two pounds less than usual, and, though thriving, may throughout the first year remain so much below average weight; though sometimes these children gain more than usual in the latter part of the year, and by the time they are twelve months old reach normal weight.

Similarly, the baby who weighs nine or ten pounds at birth may continue above average weight for a time, but later the weekly gain will probably be less than usual, and this child also at twelve months tends to reach the average of twenty to twenty-one pounds.

The child of very small parents would naturally be small framed, and consequently, throughout the first year and later, tend to weigh less than normal.

The child who is fed on his mother's milk is most likely, other things being equal, to make uninterrupted and regular gain. The bottle-fed baby, if weened when very young, as a rule gains weight slowly at first. Even when fed on the proper quantity of a good artificial food, the digestion has to become accustomed to the strange food, which could not be expected to suit it as well as mother's milk.

Overfeeding will cause a baby to gain weight rapidly for a time, but this is frequently followed by indigestion, which later may cause failure to gain, or even loss of weight. Mothers should guard against giving extra food merely with a view to increasing the baby's weight. In addition to the risk of causing indigestion, and general upset, there are other disadvantages. The baby who is "out of sorts" from indigestion is much more likely to contract infection than the healthy infant. Also, the very heavy baby does not sit up, crawl, or walk as early as the average child, and consequently needs more attention for a longer period.

Temporary mild indisposition, for example, a common cold, may be responsible for failure to gain weight for a week or so. It is often noticed that baby does not gain just when a tooth is being cut, when changing from one food to another, or during weaning. Some babies gain unequally; that is, they may gain more than the average one week, and not at all the next. This need cause no anxiety. Steady, regular weekly gain is best, but there is no need to worry over some irregularity in gain, as long as baby looks well, is happy and contented, and is sleeping well at night.

The important thing for baby, during his first nine months, is not that he should weigh more than usual, but that he should make steady gain, when fed on his mother's milk. So treated, he has the best chance of being strong and healthy, not only during his first year, but also during subsequent years.

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## THE HOME BEAUTIFUL.

### BRIGHTEN THE HOUSE WITH COLOUR AND INCREASE EVERYONE'S HAPPINESS.

Surely in these modern days there is no woman that does not wish to make her home more beautiful. Since few of us can afford entirely to refurnish our homes or even a single room, it comes as welcome news that any shabby, out-of-date room, can be transformed into real loveliness by simple methods and small expenditure.

In answer to a mood of new things, or a desire that your house should look at its best, all you need is to start beautifying something, anything, that you already have.

Bring colour into your home and the shabbiest and most commonplace surroundings will create a very different impression. Colour, new arrangements, and thought given to detail will beautify any house that appears drab and has become out of date—and without discarding existing furniture. Colour is cheap, offering itself in cretonnes, plain stuffs of gay colours, and most inexpensively in the brushing laquers that are now obtainable. New arrangements are cheap, too, for it costs nothing to try table, chairs, and sofa in a new cosy grouping or experiment with a different placing of the bedroom pieces.

Of course, the smartness of freshly tinted walls plays an important part in the quick and cheap transformation of any room, but there is nothing like a new floor-covering to add charm to some shabby room. Indulge in a colourful rug or lino square and lacquer the floor surrounds and skirtings with a colour to tone in. Then with the right window treatment—perhaps the old curtains dyed to the correct shade—and you have gone a long way towards gaining a maximum effect at a very moderate cost.

How about the furniture and the little things that mean such a lot in the general colour scheme? It is here that the modern brushing lacquers present

such wonderful opportunities for the woman with ideas. The "wet paint" bogey need no longer frighten you, or the lack of painting experience cause you to hesitate, for these lacquers dry while you are admiring what you have done and go on so smoothly that there are no ripples or marks of the brush in the finish, even though it may be your first painting job.

Picture the old bedroom furniture in a new coating of pale green, shell grey, or a delicate pink, a pretty lamp shade quickly made, a gay rug, and the cushions recovered. Very little expense, but a veritable picture of daintiness. Bathroom fittings of jade or turquoise in place of the white we have seen so long, and dozens of ideas for bringing colour beauty into the home that pop into your mind directly you think of it. To mention specific colour schemes is unnecessary, for every woman possesses a latent talent for using colour to its best advantage and the great charm of home decoration is to introduce individuality into every room.

Possibly the kitchen gives the greatest scope for showing what can be done, and it is only fitting for the joy of colour to smile back at you in the place you spend so much of your time. Why endure scratched or plain hungry wood that requires so much scrubbing when it can so easily be lacquered and made easy to keep clean. Let the chairs, table, dresser, draining-board, cupboard, and woodwork radiate with cheery colours and create an atmosphere that will banish the air of drudgery so often apparent in the kitchen. The bread crock, tea-tray, canisters, and the many articles of everyday use, right down to the dustpan, can be artistically decorated and help the general impression of brightness.

When you have seen what the magic of colour has done for the kitchen, go through each room, adding the touch of colour you know should be there, and you will find that this business of cheering up your home with colour is not only an easy way to achieve permanent loveliness, but that it is great fun as well.—"The Farmer and Settler."

## WHY NOT ELEVATE THE KITCHEN.

"There is nothing wrong with labour-saving or with matters connected with the home; the whole history of civilisation has been built up by the food we eat and might well be written from that aspect. Archestrates realised this in Ancient Greece, and his lost epic on the subject is considered by learned men and women one of the greatest losses learning and civilisation have suffered. Household equipment in the same way has formed the starting-point of many a modern scientific invention. Watts' steam kettle is a well-known instance; there are very many less known, or still unnoticed. We ought to try to raise the interests of home-workers instead of keeping them in the condition of unlettered, unambitious slavery. The status of domestic work in this country is a disgrace to the emancipation of women. Only a certain section of women has been freed from slavery, and I am often tempted to think those who have thus freed themselves are unwilling to emancipate the home workers because they want to keep their services in the home for themselves, so that they, the emancipated, may be free to devote themselves to higher interests. This is exactly the attitude of men in 1850. The truth is all work, whether in the home or outside, may be degraded or elevated according to the amount of intellect, moral effort, and spiritual or scientific significance, applied to it."—Ann Pope, in "The Woman's Leader."

## CREATIVE GARDENING.

Gardening is a pleasant pastime, but do not overburden yourself by attempting to cultivate too large a garden. Immediately you do this your work becomes a drudgery and the charm is lost. To take a plot of ground, barren it may be, rough, and rugged, and neglected, a mere weedy waste without form in design or any attractive features whatever, and to convert it into a little world of beauty and fertility is one of the most delightful achievements it is possible to attempt.

"Pictorial Gardening" says: "It is delightful, because in the best sense of the word it is natural. There is something in the very breath of the soil that gives tone and health to the body and mind. There is wholesome inspiration in the feeling that in labouring to bring out in your ground the utmost beauty of which it is capable you are working in immediate co-operation with sunbeams and breezes and showers, and with that beneficent power behind them which seems always to be striving everywhere to clothe the whole world with what is lovely and productive.

"To work out under the open sky, amid sunbeams, and winds, turf, and flowers, and twittering birds, and to fall into line with the principles of life that nature is

everywhere illustrating and enforcing around you, can hardly fail every now and again to bring you very near in thought and feeling to the Creative Power throbbing and pulsing in every blade and leaf about you.

"As you go on your love of all that is fair and beautiful in the natural world around you will increase, and if you are tolerably easy in mind, simple and natural in your tastes, and have a very moderate endowment of the imaginative, then the hours in your garden will not only be amongst the most delightful of your life, but in the best sense they will also be amongst the most profitable, benefiting the very nature of you."

## KITCHEN GARDEN.

Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; and in cool districts horse radish can be set out.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

## FLOWER GARDEN.

No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring-time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lots, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground. Many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondi*, stocks, wallflower and zinnias, &c., may be sown either in boxes or open beds. Mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors, plant bulbs such as anemones, ranunculus, fresias, snowflakes, ixias, watsonias, iris, narcissus, daffodil, &c. The Queensland climate is not suitable for tulips.

To grow these plants successfully it is only necessary to thoroughly dig the ground over to a depth of not less than 12 inches, and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should be raked over smoothly so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave the plants (if in the border) at least 4 to 6 inches apart.

# Farm Notes for June.

Field.—Winter has set in, and frosts will already have been experienced in some of the more exposed districts of the Maranoa and Darling Downs. Hence insect pests will to a great extent cease from troubling, and weeds will also be no serious drawback to cultivation. Wheat sowing should now be in full swing, and in connection with this important operation should be emphasised the necessity of at all times treating seed wheat by means of fungicides prior to sowing. Full directions for "pickling" wheat by copper carbonate treatment are available on application to the Department of Agriculture, Brisbane. Land intended for the production of early summer crops may now receive its preliminary preparation, and every opportunity taken advantage of to conserve moisture in the form of rainfall where experienced; more particularly so where it is intended to plant potatoes or early maize. Where frosts are not to be feared the planting of potatoes may take place in mid-July; but August is the recognised month for this operation. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them under cover and in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sandpit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size, and finally cover with either straw or fresh hay. The sand excludes the air, and the potatoes will keep right through the winter. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas.

Cotton crops are now fast approaching the final stage of harvesting. Growers are advised that all bales and bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus address labels.

# Orchard Notes for June.

## THE COASTAL DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward, tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry the tree should then be given a good watering, and when the water has soaked in the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas, during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bonedust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the spring should be got ready now.

Strawberries require constant attention, and, unless there is a regular and abundant rainfall, they should be watered regularly. In fact, in normal seasons an adequate supply of water is essential, as the plants soon suffer from dry weather or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt area, which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring, and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime can also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt, and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as, if allowed to remain longer on the tree, they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

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*THE JOURNAL APPRECIATED.*

*Thus a Cooroy reader (8th April, 1929):—"I have been subscribing to the Journal for eighteen months, and I assure you I greatly appreciate it."*

Plate 105.—Dodging the Barbed Wire.
A handy stile for getting over dividing fences.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | May, 1929. | | June, 1929. | | MOONRISE. May, 1929. | MOONRISE. June, 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | a.m. |
| 1 | 6.21 | 5.17 | 6.39 | 5.0 | 10.54 | ... |
| 2 | 6.21 | 5.16 | 6.39 | 5 0 | 11.51 | 12.25 |
| 3 | 6 22 | 5.15 | 6.40 | 5.0 | | 1.31 |
| | | | | | a.m. | |
| 4 | 6.23 | 5.14 | 6.40 | 5.0 | 12.49 | 2.31 |
| 5 | 6.24 | 5.14 | 6.41 | 5.0 | 1.48 | 3.34 |
| 6 | 6.24 | 5.13 | 6.41 | 5 0 | 2.47 | 4.42 |
| 7 | 6 25 | 5.13 | 6.42 | 5.0 | 3.48 | 5.54 |
| 8 | 6.25 | 5.12 | 6.42 | 5.0 | 4.50 | 7.5 |
| 9 | 6.26 | 5.11 | 6.42 | 5.0 | 5 55 | 8.14 |
| 10 | 6 26 | 5.11 | 6.42 | 5 0 | 7 8 | 9 18 |
| 11 | 6.27 | 5.10 | 6.42 | 5.0 | 8.17 | 10.14 |
| 12 | 6 27 | 5.10 | 6.43 | 5.0 | 9.27 | 11.1 |
| 13 | 6 28 | 5.9 | 6.43 | 5.0 | 10.33 | 11.39 |
| | | | | | p.m. | p.m. |
| 14 | 6 28 | 5.9 | 6.43 | 5.0 | 11 31 | 12.13 |
| | | | | | p.m. | |
| 15 | 6 29 | 5.8 | 6.43 | 5.0 | 12.23 | 12.44 |
| 16 | 6 29 | 5 7 | 6.44 | 5.0 | 1.3 | 1 15 |
| 17 | 6 30 | 5 7 | 6.44 | 5.0 | 1.40 | 1.44 |
| 18 | 6 30 | 5 6 | 6.44 | 5 1 | 2.12 | 2.15 |
| 19 | 6 31 | 5.6 | 6.45 | 5 1 | 2.42 | 2.51 |
| 20 | 6.32 | 5 5 | 6.45 | 5.1 | 3.12 | 3.27 |
| 21 | 6.33 | 5.5 | 6.45 | 5.1 | 3.43 | 4.10 |
| 22 | 6 34 | 5 4 | 6.46 | 5.2 | 4.16 | 4.57 |
| 23 | 6.34 | 5 4 | 6 46 | 5.2 | 4.52 | 5.49 |
| 24 | 6.35 | 5 3 | 6.46 | 5.2 | 5.30 | 6.42 |
| 25 | 6.35 | 5.3 | 6.46 | 5.3 | 6.14 | 7.36 |
| 26 | 6 36 | 5.2 | 6.46 | 5.3 | 7.3 | 8.33 |
| 27 | 6.36 | 5 2 | 6.46 | 5.3 | 7.54 | 9.28 |
| 28 | 6.37 | 5.1 | 6.46 | 5.4 | 8.48 | 10.24 |
| 29 | 6.37 | 5.1 | 6.46 | 5.4 | 9.42 | 11.20 |
| | | | | | | a m. |
| 30 | 6.38 | 5.0 | 6.46 | 5.4 | 10.40 | 12.18 |
| 31 | 6 38 | 5.0 | | | 11.36 | |

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|---|---|---|---|
| 2 May | ☽ | Last Quarter | 11 25 a.m. |
| 9 „ | ● | New Moon | 4 7 p.m. |
| 16 „ | ☾ | First Quarter | 6 56 a.m. |
| 23 „ | ○ | Full Moon | 8 49 p.m. |

Perigee, 11th May, at 6.6 a.m.
Apogee, 26th May, at 5·54 p.m.

The Astronomical event of this month will be a total eclipse of the Sun, on the 9th, of unusual duration, lasting for about 5 minutes at Siam and the north end of Sumatra, to which places scientific expeditions will be sent from Europe and Australia; others may go to the Phillipine Islands. It will be invisible from the south-eastern part of Australia, but some glimpse of it as a partial eclipse will be observable in northern New South Wales, the whole of Queensland, and North Australia, also in the greater part of South and West Australia. Only a very small part of the Sun will be obscured at Brisbane, about 5 p.m., but the obscuration will be greater in the west of Queensland, where observations should be made half an hour earlier, care being taken to use deeply coloured and smoked glasses.

Jupiter will be on the far side of its orbit beyond the Sun and nearly in a line with it from the earth and therefore invisible on the 14th.

Mercury will be well situated for observation this month, being well above the horizon after sunset, especially on the 15th, being also nearly at its greatest brilliancy.

The beautiful planet Venus, after disappearing entirely from our view by the middle of April, will again grace the eastern sky before sunrise in May, growing more and more brilliant till the 26th, when it will shine almost as brightly as when in the west in March.

At 8 o'clock in the evening on May 1st Mars will be the only planet visible. It will be in Gemini somewhat low down in the north-west above Castor and Pollux and between the latter and Procyon, with the more brilliant star Sirius following Orion. Later in the month Saturn will also be an evening star. The six Zodiacal Constellations arching the sky from east to west early in the month will be: Gemini, Cancer, Leo, Virgo, Libra, and Scorpio. As the last-mentioned rises over the eastern horizon, Orion will be getting near the western. These constellations will be seen to advantage early in May.

| | | | |
|---|---|---|---|
| 7 June | ● | New Moon | 11 56 p.m. |
| 14 „ | ☾ | First Quarter | 3 14 p.m. |
| 22 „ | ○ | Full Moon | 2 15 p.m. |
| 30 „ | ☽ | Last Quarter | 1 53 p.m. |

Perigee, 8th June, at 1.30 p.m.
Apogee, 22nd June, at 10.54 p.m.

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXI. 1 JUNE, 1929. PART 6.

## Event and Comment.

### The Queensland Sugar Industry.—The Facts Restated.

THE Commonwealth Trade and Customs Department has performed a timely and valuable service to the sugar industry by its recently published examination of the whole sugar position. Its restatement of the facts should be convincing enough for the most economically minded member of the Victorian Housewives' Association, and should remove all doubts as to the wisdom of the present Federal sugar policy. Under that policy only wholesale and manufacturing prices have been fixed, but the wholesale rates are so based as to allow of refined sugar being obtained in every State capital, at a retail price of 4½d. a pound. To wholesale houses the price is £37 6s. 8d., less 2 per cent. discount for cash, and to retailers and housewives the price is the same, without the discount, for more than half-ton lots. Home manufacturers pay £36 11s. 9d. net cash; a special concession is given to fruit processors who pay only £30 6s. 8d. a ton. Under another special provision mill whites are supplied at £33 3s. 9d. a ton cash to retail grocers and housewives for any quantity in excess of half a ton which is the minimum; and £32 10s. 6d. to wholesalers and manufacturers.

The special price to fruit and jam canners has reduced, it is contended, their annual manufacturing costs by over £180,000. Besides stimulating sales, this reduction in factory costs has also been of material assistance to orchardists by increasing the demand for their fresh fruit. Manufacturers, under this arrangement, have also been placed in at least as good a position as regards sugar costs as they would occupy were there no embargo. Then again, an export rebate of ordinary

home consumption prices is given; and these rebates have varied between £80,000 and £109,000 a year, and are fixed by the Export Sugar Committee which is representative of the three interests concerned—the sugar industry which pays the rebates, the manufacturers for export who buy the sugar and receive the rebates, and the Government.

## Why the Industry is Protected.

THE chief reasons given for this particular form of protection to the sugar industry are:—(1) World's sugar prices have always been subject to considerable fluctuations, which would cause great difficulty in establishing a fixed rate of duty which would at all times be fair to both producer and consumer. A fixed rate would sometimes give the sugar industry excessive profits at the expense of the consumer, and at other times insufficient profits, or, perhaps, losses, that would seriously injure the industry. Moreover, the constantly fluctuating home consumption price would be more or less embarrassing to manufacturers using sugar in a large way.

(2) After many years' experience, the industry has been found to be the only one capable of establishment on a large scale in the vulnerable coastal districts of the North. Consider, in illustration of this, that from Townsville north there is a population, within a fairly small area along the coast, of approximately 100,000, whereas in the Northern Territory, in approximately the same latitude, the population is only about 3,000. The White Australia policy is intimately bound up with the sugar industry.

(3) If Australia were to import her sugar from abroad, something between £4,000,000 and £5,000,000 a year would be paid to countries where the balance of trade is already substantially against Australia.

(4) The sugar industry pays over £6,000,000 a year in wages, and has created a very large trade with Southern States in manufactured goods of all descriptions.

(5) Sugar production has entirely changed since the kanaka days. A large proportion of the sugar was then produced under the plantation system with numerous large holdings. To-day there are over 8,000 individual farmers engaged in the industry, cultivating an average of 37 acres each and only seven or eight plantations still remain. This has resulted in an intense form of closer settlement which has great advantages both economically and socially.

Since Government control started in 1915 the acreage under production has increased from 173,000 to 284,000, and the number of direct employees from 16,700 to 30,000, while employment is, of course, provided indirectly for many thousands more.

## Practical Co-operation.

IT is all very well talking to the farmer, or perhaps talking at him, about the need of adopting modern methods and using up-to-date machinery on his holding if he has not the wherewithal to do it. There are many farmers (good men, too) who, starting without sufficient capital, are struggling on towards that happy day when they can go to the machinery merchant with every confidence to buy and pay for the power to lighten their labour and for which they have longed for years. They realise, none better, the necessity of reducing the costs of production, but the simple fact is they cannot afford the extra and necessary plant. Still, if there is a way out at all they will never be stuck. That is the case with some canegrowers at Bli Bli in the Nambour district. A few of them got together

and formed a syndicate for the purchase of a tractor and a rotary hoe. They went into the matter on a business basis and these modern machines have scarcely been idle a day since their purchase. A charge of 12s. 6d. an acre is made to all users, and where an area cannot be conveniently measured an hourly rental rate is imposed. The machines are available also to non-shareholders who quite fairly are asked to pay a larger fee, £1 per acre being the usual amount, and the machines are used as much by these farmers as by the co-operators. The saving of labour and time means money earned and this fact the farmers are realising in a very convincing way, and the general lament is that this co-operative plan was not put into practice long ago. It has been found, for instance, that on old cane land the rotary hoe can cover 5 acres in the eight-hour working day. It is also used largely in ratooning. By the simple plan of removing the middle bar a row can be straddled and the soil thoroughly stirred alongside the stools on each side. It is now proposed to add a double disc plough to the plant and a saw bench fitment for cutting firewood to the tractor. The present difficulty of the co-operating owners is to satisfy all the demands on their small plant, and this will no doubt lead to its duplication, or even its multiplication, which will be to the benefit of the cane-growers and other farmers in the district. As a case of practical co-operation it is to be commended, especially in districts in which, generally, crops or holdings are too small to justify the individual purchase of expensive machinery. The advantages of power farming on suitable land are so obvious that the small holder will welcome an opportunity to employ it without losing an hour's sleep in wondering how he is going to get over the initial financial hurdle.

## Sugar and Pineapples.

ON some of the drained swamp lands round about Bli Bli excellent crops of cane are growing, and this on country that on account of its waterlogged state was formerly regarded as useless except for the game with which it abounded. The crop that it is at present carrying is the best evidence of the soundness of the judgment of those who saw its possibilities once it was drained. Some good crops have been taken off it, and the returns over a series of seasons have quite justified the faith of those who first realised its value and persevered with their plans for bringing it into profitable production. Cane cultivation has been well seconded with pineapple growing, and the local "gardens" have already won a reputation for the flavour and sugar content of their fruit. Large areas are now under crop and some farmers are combining the two crops to their financial advantage, which will continue so long as there is a stabilised market. Paper mulching is used to some extent, and this practice is a great labour-saver as well as a crop insurance. Anybody who has had to live laborious days on a pineapple farm will appreciate anything that will keep the weeds down, and paper mulch does this very effectively. Not only that, but it conserves moisture, and greatly reduces the possibilities of disease. There is another point about paper and that is where fertiliser is used it is reserved for the actual crop and is not exhausted by wet season weeds. For pineapple growing paper mulch is becoming to be regarded as indispensable, and wherever the long parallel strips are seen there you will find orderly fields, quite free from soil-robbing "sports" of every description. At Bli Bli there is a farm on which sugar and pineapple growing are economically combined; and on this holding agricultural standards are high in every department and the condition of the crops and the general layout and obvious intelligent management of the place are all expressive of what is meant by sound field practice the value of which, it is certain, is reflected in crop and market returns.

# THE HON. HARRY F. WALKER.

## NEW MINISTER FOR AGRICULTURE AND STOCK.

The Hon. Harry F. Walker, Minister for Agriculture and Stock in the new Queensland Government, was born at Gympie on 15th April, 1873. All his early life was lived on the goldfield that has contributed so much to Queensland's progress. He was educated at the One-mile and Monkland State Schools and afterwards at a private Grammar School.

As a young man mining naturally attracted him, and for twelve years he was engaged actively in that industry, both on top and underground. Mr. Walker saw the transition of his native district from one of the most profitable gold-producing provinces to one of the richest and most progressive dairying regions in Australia. In 1910 he acquired a considerable area of land near Gympie and entered into diversified farming in which he has been very successful, particularly in dairying which is his main interest.

Mr. Walker was first elected to Parliament as the representative of Wide Bay in 1907, and has held a seat in the Legislative Assembly ever since. On the redistribution and renaming of electorates some years ago he contested Cooroora, a district on the near North Coast, and had no difficulty in securing the representation of that important rural constituency. His valuable services, Parliamentary and otherwise, to the agricultural and stock raising industries have been recognised by his return without opposition at several successive elections.

Twenty-three years ago, in association with a few other progressive dairy farmers, Mr. Walker assisted very materially in the organisation and establishment of the Wide Bay Co-operative Dairy Company, of which he has been Chairman of Directors for a number of years, besides being a director ever since its inception. This company controls two large modern butter manufacturing plants at Gympie and Cooroy. Its Gympie factory is one of the largest and most complete in the Commonwealth, and in the quality of its output has achieved an enviable reputation on home and oversea markets.

The co-operative movement in Queensland has had in Mr. Walker an ardent, long-sighted and very practical advocate. His interest in dairying particularly led him in 1924 to investigate personally manufacturing methods and marketing systems in Great Britain. This investigation was extended to the Continent and its results have already proved of benefit to the industry in this State, especially on its selling side. While abroad Mr. Walker was also a close observer of agricultural conditions in Europe. He made a special on-the-spot study of Danish dairying organisation and marketing methods, and on his return home contributed a valuable series of Press articles, in which comparisons were often in favour of Queensland, and which added very considerably to our knowledge of present-day dairying practice.

In his day he was a noted athlete and horseman. A supporter of the volunteer movement he joined the Queensland Mounted Infantry which was later to win renown on South African battlefields, and was among the picked body of men chosen to represent Queensland at Queen Victoria's Diamond Jubilee Celebrations in England in 1897. With other Gympie young men who have since loomed large in our public, commercial, and industrial life, including Major-General Senator Sir William Glasgow, the Federal Minister for Defence, Mr. Walker joined the first Queensland contingent accepted for service in the last Boer war. He was with his regiment in every engagement, including Sanna's Post where he won distinction, until he was invalided home.

In his youth the new Minister excelled as an exponent of military sports and figured with success in international tournaments in England at which Queensland Mounted Infantrymen competed, as well as in the Light Horse tournaments at Lytton in the old volunteer days.

Mr. Walker's home is at Tewantin, on the near North Coast, and in the centre of our beautiful lake country. In hours of limited leisure he finds recreation in shooting and fishing in a countryside abounding in native game.

PLATE 106.—HON. H. F. WALKER, MINISTER FOR AGRICULTURE AND STOCK.

## VALEDICTORY.

### RETIREMENT OF THE HON. W. FORGAN SMITH.

The Hon. W. Forgan Smith, the retiring Minister for Agriculture and Stock, invited the whole of the staff of the Department to meet him in his room on the eve of his relinquishing office for the purpose of bidding them farewell.

Mr. Forgan Smith said that he was very pleased to see so many of his former staff present. He wanted to take that opportunity of thanking them for the very faithful and loyal service they had given him as their Minister. He was about to take his departure from the Department, and he wanted to assure them that he would continue to take a very keen interest in their welfare and their activities in the service of the agricultural industry. He considered that the Department of Agriculture and Stock was the most important in the State, and it was very pleasing indeed to observe that on his recent election tour that there was everywhere appreciation and praise of the Department and its officers. There was a very healthy feeling between the Department and the men on the land, and that co-operation was something that he had always endeavoured to foster. In the development of Queensland agriculture the officers of the Department would continue to play an increasingly important part. The resources and personnel of the Department had been built up with that fact in mind, and its staff, laboratories, and other equipment compared most favourably with those of every other State. Continuing, he added—

"Your sphere of utility to the State is one that is worth while. The provision of a nation's food supply and the elements that go to provide for a people's needs all depend on their agricultural resources and what use is made of them. During my period of office, extending a little over four years, much beneficial legislation has been enacted and certain sound developments have taken place. That, of course, has resulted in certain organisations being built up, which I think will be a permanent feature of the life of the State.

"I just wish to express my very hearty appreciation of the very loyal and efficient service that has at all times been given me as the Ministerial head of the Department, and I feel that loyalty and service will be extended to my successor and to whichever Government is in power. I will continue to take a very keen interest in the work you are doing, and, finally, I would advise the Department in its administration never to allow any other organisation to usurp the functions and activities that could only properly be exercised by the Department. (Applause.)

The Under Secretary, Mr. E. Graham, on behalf of his fellow officers of the Department, thanked Mr. Forgan Smith for asking them to meet him on the eve of his severance with the Department. They appreciated very sincerely the laudable references their former Minister had made to the officers of the Department. They knew that he had set efficiency as his standard, and the splendid example shown by himself as Minister and the keen interest he had taken in the work of his officers he (Mr. Graham) felt sure had had a very striking influence on their work. The fine example of efficiency and co-operation he had set had been reflected throughout the Department. Mr. Forgan Smith's association with them as Ministerial head had extended well over four years; that was a fairly long term for a Minister to remain in one Department, and though it might not be a record as far as time was concerned, he thought that it embraced a record of service to the agricultural industry that would be very difficult to equal. (Applause.)

As a mark of their esteem of Mr. Forgan Smith's sterling qualities, his fellow-officers had requested him to accept a small gift. That gift was also some little tangible evidence of their appreciation of him as a citizen who had taken a prominent place in the affairs of the nation, and also as a man. It was desired also that Mr. Smith should have some little reminder of his association with the Department and its officers. (Applause.)

Mr. Graham then presented to Mr. Forgan Smith a solid silver cigar box, suitably engraved, and a silver cigar cutter and holder.

Mr. Smith feelingly responded. He was leaving the Department, he said, with the heartiest good feeling towards every officer, and his interest in their work would increase rather than lessen with the passing of the years. (Applause.)

Mr. Smith then thanked each officer individually for services rendered to the Department while he was in control.

# Bureau of Sugar Experiment Stations.

## CANE PESTS AND DISEASES.

*Mr. R. W. Mungomery, Assistant Entomologist, stationed at Bundaberg, has submitted the following report (27th May, 1929) to the Bureau of Sugar Experiment Stations:—*

### RAT DAMAGE IN CANEFIELDS.

#### Farmers, Beware of Rats.

It is now opportune to issue a note of warning to farmers to keep a keen watch for rats damaging their cane. Cases of destruction of maturing cane by rats have already occurred this season, and more are likely to be met with as the season advances. It is with the object of minimising damage and suppressing these pests that the following notes have been prepared.

#### Nature of Injury.

Rat attack can easily be recognised by the peculiar nature of the injury, since sticks are damaged by gnawing into the internodes and eating away the softer internal fibres, leaving portion of the hard rind and the nodes intact. Several internodes in succession may be eaten in this manner if the cane be particularly sweet and suitable, whilst at other times, and especially if the cane is immature, only one internode may be eaten into and abandoned. In such cases, these points of attack constitute points of weakness in the individual sticks, and the portions above the damaged part are readily snapped off when the first windy weather is experienced. In other cases, the top portion of the stick may dry out, and the bottom portion may send out a vigorous growth of shoots, thus directing growth into wrong channels. From this it will be apparent that the total loss involved by farmers through rat depredations amounts not solely to the cane actually eaten, but is represented by the total tonnage destroyed, which at times is considerable.

#### Where to Look for Damage.

Sweeter varieties of cane are more subject to attack than the poorer quality canes, and rats also show a decided preference for the canes with a soft rind; thus it is evident that damage is most likely to occur in sweet varieties possessing a soft rind. Most frequently rat attack commences on farms bordering or adjacent to river banks, creeks, and swamps, &c., where good supplies of grass and debris offer excellent shelter and breeding grounds for them. Uncultivated gullies in farm areas are usually sources from which rat invasion commences, and old standover cane which has become twisted and lies down is particularly attractive to rats, for, in addition to being provided with an adequate supply of food, they are also protected from the attacks of hawks, owls, and other birds of prey.

#### Control Measures.

To exterminate rats, consideration must first of all be given to the destruction of their shelter and breeding grounds. Grassy paddocks should be fired annually after the nearby cane crops have been harvested. Spaces intervening between blocks of cane should not be allowed to support a rank growth of grasses. Where, because of the uneven contour of the land, it is not possible to cultivate the whole of a farm, any such waste land might well be fenced off to serve as paddocks for stock.

When natural methods of control, such as have been enumerated above, have been carried out and rat damage still occurs, the use of poison baits as a means of lessening their numbers and abating the menace is to be recommended. The most successful and convenient bait to use is the Barium biscuit bait, which has been used with good results in the Mulgrave district in past years, and which likewise has proved effective in the Bundaberg district in the few instances in which it has been used. To obtain the utmost efficiency from such a method, it is essential that concerted action be taken by all growers affected, and if neighbouring growers co-operate when damage commences, much good will accrue, whereas the task is much more difficult for one grower to tackle single-handed. Especially is this so if he is confronted with the task of wiping out rats migrating from neighbouring properties where no system of control is being practised.

To make Barium biscuits, the following ingredients are required in the proportions set out hereunder:—

| | |
|---|---|
| Barium carbonate .. .. .. .. .. | 10¼ lb. |
| Flour .. .. .. .. .. .. .. | 21¼ lb. |
| Pollard .. .. .. .. .. .. | 4 lb. |
| Tallow .. .. .. .. .. .. | 6 lb. |
| Salt .. .. .. .. .. .. | 9½ oz. |
| Water .. .. .. .. .. .. | 1 gallon. |
| Aniseed oil .. .. .. .. .. .. | ½ oz. |

**Method of Mixing.**

Sieve the Barium carbonate and break up all lumps, then mix this poison thoroughly with the pollard and flour in the dry state. Heat the tallow until melted, and then knead it into the flour-pollard-barium mixture. Dissolve the salt in about ¼ gallon of water and add this to the mass, working it thoroughly and adding the remainder of the water in small amounts as considered necessary, until an even dough is obtained which will just stick together. Roll this dough to a thickness of not more than ¼ inch on to trays, cut into pieces ½ by ½ inch and bake in a moderate oven until completely dry. Then mix the aniseed oil with an equal quantity of water and spray over the biscuits when they are cool. A small "Lotol" spray or similar device will serve excellently for this purpose. The bait is then ready for use. It is advisable to handle the biscuits as little as possible, and to rub oil of aniseed on the hands when distributing the bait in the fields.

This mixture is both cheap and effective, and has the further advantage of not being highly poisonous to stock, dogs, or human beings, although only a small portion of a biscuit is required to kill a rat. However, to guard against any cases of poisoning, it is advisable to scatter the baits in places inaccessible to stock, and to store the biscuits out of reach of children.

Barium carbonate may be purchased from Messrs. Taylors and Elliotts, Limited, 154 Charlotte street, Brisbane, and costs approximately 1s. 3d. per lb. The oil of aniseed can be procured from any chemist, whilst the other ingredients may be purchased from the local grocers and butchers.

**Distributing the Bait.**

In distributing the bait, the usual procedure is to scatter six biscuits every 5 yards along headlands, banks of creeks, &c., where rats are plentiful, and walk through the cane along every twentieth row distributing bait at the rate of six biscuits every 10 yards. This is only a rough guide, as no hard-and-fast rules can be laid down, and distribution of the bait will have to be carried out from a common-sense point of view. Thus, much will be left to the discretion of the person scattering the bait, and he should concentrate on those portions of the field where damage is showing up worst. Used in this manner, Barium biscuits have given excellent results as an effective rat poison, and those farmers who have once tried them are very enthusiastic concerning the benefits to be derived from this system of wholesale poisoning.

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*Following is a report* (15*th May*, 1929) *of the Division of Soils and Agriculture:—*

## EXPERIMENTAL PLOTS.

The major project of this division for the past quarter has been the initiation of the systematic farm experimental trials. The field officers have suspended temporarily their farm-to-farm inspections, and have spent their time in the selection of farms and farmers suitable for the work. The necessary preliminary arrangements for a number of autumn plantings were also put through, and we have to report that twelve trials have now been set out successfully in the Bundaberg and Mackay areas.

The growers on whose lands these trials are located are—

*Southern District.*

Gahn Brothers, Tantitha.
Qunaba Plantation, Bundaberg.
L. M. O. Lucas, Skyring's Reserve.
P. Petersen, Bingera.
A. Adie, Childers.
Burrage Brothers, Maroondan.

*Mackay District.*

J. Trevaskis, Farleigh.
H. Single, Foulden.
E. Evans, Richmond.
J. Gibson. Racecourse.
Alexandra Plantation, Palms.
Laws and Baker, North Eton.

Variety trials have also been set out on Windermere and Fairymead Plantations to test the value of certain promising Indian varieties, which were introduced during the past few years, against the standard canes of the area.

Growers are urged to follow the progress of those plots which have been set out on lands on which the soil type is similar to that on their own farms; for it is hoped the results obtained will be generally applicable on all lands of a similar type in the particular area.

The arrangements for the proposed trials in the Northern area are also well in hand, and, given favourable planting conditions, the laying-out of the plots will be pushed ahead.

The names of the farms on which trials have been set out will be published from time to time.

## Supply of Fertilisers.

We are pleased to announce that the fertiliser distributing firms have displayed considerable interest in the farm trial project. In their desire to be of practical assistance in the work, they have placed at our disposal a quantity of fertiliser sufficient for the requirements of the sixty trials which we plan to set out this year. The fertiliser will then be passed on to the growers on whose land trials are located, in return for any added labour which the experimental trial may impose upon them.

## Suggestions for Mackay Growers.

In the course of our field work in the Mackay district we have attempted to determine some of the problems which stand in the way of crop improvement; and we have prepared the following notes bearing on these questions, together with our proposals for a solution of these difficulties.

A study of the cane soils in the valley of the Pioneer River shows that they are, in general, of an alluvial nature. Along the river banks the deposits are of recent origin, and are consequently deep sandy loam soils. Now this "sand" is not altogether quartz sand, and under weathering conditions it decomposes to give a sandy clay—the "red clay" that is often spoken of in describing the older subsoils, which are developed at some distance from the river. The soils on the majority of the plain are from 8 to 16 inches in depth, and this variation in depth of surface soil is the feature which requires study in the intelligent cultivation of the soil.

In general, an "ironstone" layer is met with between the soil and the subsoil proper. This is only 1 or 2 inches thick, but is a most important factor in the welfare of the crop. This layer is generally "tight" and impervious to water. Our borings by means of a soil auger have shown that the subsoil beneath this pan may be quite dry, even after continuous rains, while the surface soil cannot be worked due to excessive water which cannot drain off.

Now it is well recognised that crop roots require a well-drained aerated soil if they are to function successfully. Hence the net effect of such a hard pan at a depth of but a few inches below the surface is to give a shallow soil which, without adequate surface drainage, readily becomes water-logged, and under dry conditions the plant is not able to draw on a supply of moisture which might be yielded by the subsoil.

The remedy is, then, to attempt to break up this hard-pan layer, and thus increase the depth of available soil. Where the soil is but 8 inches deep it is recommended that at each breaking of the land a little of the subsoil (say 1 inch) be brought up by the plough, and worked into the surface soil. In this way the layer will be destroyed, and the depth of soil gradually increased.

Where the hard pan occurs at a depth of 10 to 12 inches this method may not be practicable. In this case the use of the skeleton plough or subsoiler may be employed, and thus break up the layer to promote better drainage conditions and provide a ready passage for the roots into the subsoil.

**Surface Drainage.**

On many lands a system of adequate surface drainage is very desirable to hasten the removal of the surplus water which the land receives during the wet season, and thus aid in the restoration of soil conditions more suitable for the growing crop.

When making field waterways with the scoop the transported soil should be distributed evenly and back from the headlands, otherwise the field becomes basin shaped. Planting in beds would also aid materially under conditions of difficult drainage.

It is significant that many growers could advantageously cultivate smaller areas with more profitable results. Better and more timely cultivation would then be possible, and the crop would respond better to the cultural treatment, besides giving the full benefits to be derived from the use of fertiliser. Earthing-up to plant and ratoon cane is a practice too frequently abused.

**Varieties.**

Too many varieties are grown. A selection of four varieties should meet the requirements of 90 per cent. of the lands in this area, and all others should be discarded. We are aiming at assisting growers in this respect by laying out well-planned varietal trials under varying soil conditions.

**Fertiliser Applications.**

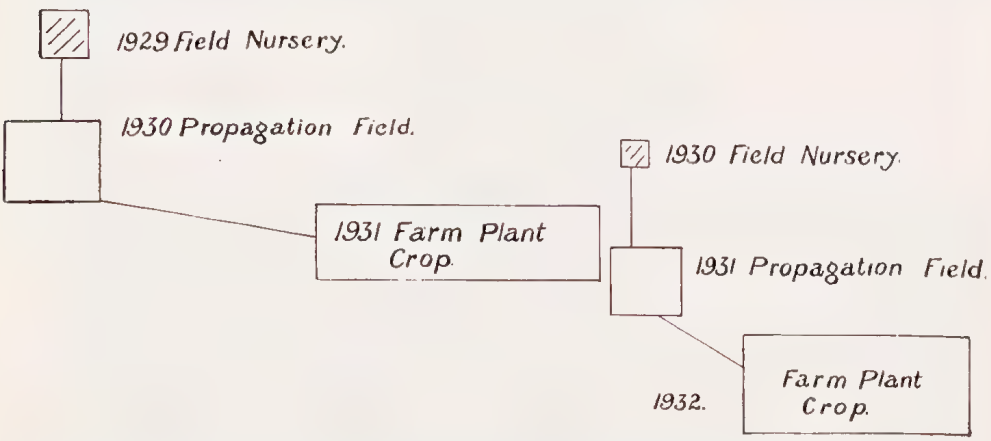
Every attempt should be made to stimulate vigorous crop growth early in its life. Early applications of fertiliser are a very valuable aid in this respect. It is recommended that at least a portion of the fertiliser be applied in the drill at planting, and the balance in a furrow made near the cane row, as soon as the crop is established. Sulphate of ammonia or nitrate of soda should be applied as a top dressing always.

With ratoons, all mixed fertiliser should be applied in the drill when cutting away from the stools; if practicable this should be done within two or three weeks of harvesting. Extra nitrogen applications in the form of sulphate of ammonia should be made as a top dressing six or eight weeks later.

**Use of the Best Cane for Seed.**

Only the best material should be used for planting. This has proven the soundest policy both in this country and elsewhere. A good plan has been devised on certain Hawaiian plantations, which might be adopted here. It aims at securing only sound and healthy material for plants. Selected seed is planted in a section called the field nursery. The cane cut from this plot is transferred the following year, after reselection, to the propagation or field seed plot. This field is ready in the following year to supply sound and healthy canes for farm planting purposes.

The process is repeated each year. The plan may be represented diagrammatically as follows:—




The area of land needed for this purpose would be quite small—the propagation field need not, in general, exceed 2 acres in extent—and growers could assure themselves of a ready supply of most suitable planting material.

## FUTURE WORK OF THE DIVISION OF AGRICULTURE AND SOILS.

With the return of the three travelling research fellows from overseas recently, the Bureau has been reorganised in order to promote more efficient working amongst its different branches. Four divisions have now been created, each with an officer in charge, as follows:—

Division of Agriculture and Soils—Dr. H. W. Kerr, Chemist and Agriculturist.
Division of Pathology—Mr. A. F. Bell, Pathologist.
Division of Entomology—Mr. E. Jarvis, Entomologist.
Division of Sugar Technology—Mr. N. Bennett, Sugar Technologist.

The officer in charge of each division will work out his plan of campaign, in consultation with the Director, and direct the activities of the officers attached to his branch.

The future policy of the Division of Agriculture and Soils has been finalised recently, and it is felt that growers will be interested to learn of the nature of the investigations which are being carried out.

The ultimate aim and object of the Bureau must be to assist growers in reducing costs of production. Our Pathologists are endeavouring to instruct farmers in the identification of diseases, and in the control measures which they should adopt to obviate losses due to this cause. They are also attempting to secure new varieties, resistant to disease, and at present quite a number of foreign-bred seedlings are being grown, preparatory to disease-resistance trials. Under their supervision seedlings will also be raised in Queensland, with a view to securing superior disease-resistant varieties.

The Entomologists are studying the life histories and habits of insects of economic importance to the cane industry, and they, in turn, are seeking control measures to enable the checking of this form of wastage.

To the Agriculturists falls the task of demonstrating the best cultural methods to employ, of determining the fertiliser needs of our various soil types, and of the adequate testing of cane varieties to find out which are best suited to our various districts. In addition, the Experiment Stations will continue their field trial work and the propagation of varieties while this year the practice of seedling raising will be extended to the Mackay and Bundaberg Stations.

All seedlings are raised at present at South Johnstone, where conditions are so admirably suited to the securing of crosses between different varieties to produce new seedling canes. Conditions on our other two stations are not so satisfactory in this respect, so that it will be necessary to transfer arrows which have been produced at South Johnstone to each of the more southern stations. Here they will be planted out, and the resulting seedlings tested for their suitability under the particular conditions of those districts.

The major portion of the work of the Agricultural Division for some years to come must be, however, the laying down of suitable farm trials, in order to determine the fertiliser requirements of our important soil types. In the past, fertility trials have been confined to the Experiment Stations; but it is appreciated that the results obtained on these lands are quite limited in their application, and it is more desirable to secure our knowledge for the several soil types in any district by well conducted field trials on the lands of chosen farmers in that area.

Our experiences have taught us that much can be attained on our sugar lands by the use of the correct fertilisers applied at the right time and in appropriate amounts. This is the reason for our attaching so much importance to this phase of the work. It will be appreciated that, to carry on the work successfully, much careful supervision will be involved in the planning, laying out, making growth observations, and harvesting of these farm trial plots. For the coming planting season about fifty or sixty of these trials will be set out on selected areas throughout the Queensland sugar districts. It is our plan to extend this work from year to year, and as each trial must be carried through at least to the second ratoon crop there will be about 200 such trials under way within three or four years.

Our method is to inspect each district and select lands which are about to be planted, which carry soils representative of important types found in the area. A trial is then planned which should yield the maximum amount of useful information regarding the response to the important fertilising constituents either singly or combined. Results from such trials will afford us definite knowledge regarding the need for nitrogen, phosphoric acid, potash, &c., on that soil type. It will then be possible to give a trustworthy recommendation as to the proportions of the various constituents in a mixture best suited to the particular soil.

In selecting farmers for our purpose we have deliberately chosen, as far as possible, those men who are keen and appreciative of the value of this type of work, and who command, moreover, the confidence of their neighbours whose lands possess

soil of a similar type. It is thus hoped that the latter will be interested in watching the development of the trials and be convinced of the value of the results so obtained. The chosen grower is asked to supply the fertiliser required for the trial, but the added work of plot layout, supervision of harvesting, &c., will be taken in hand by our officers. The produce of each plot will be carefully weighed and analysed so that the true value of the treatments may be accurately determined. The co-operation of the various mills has been assured us with regard to the latter phase of the work.

As we are able to handle this year, on an average, only two trials in each mill district, it is appreciated that many growers who would willingly co-operate with us in this respect must be disappointed for the time being. But as the scope of the work will be extended from year to year, it is hoped that they will have an opportunity, at a later date, of having trials set out on their farms.

For the present the trials will be confined to a determination of the fertiliser requirements of the soil and crop. However, the scheme will be extended so as to embrace all phases of experimental work, which will help growers in their pursuit after increased efficiency in sugar-cane cultivation.

It must be pointed out that the Bureau can help only those growers who will try to help themselves. Only by the closest co-operation between growers and the officers of the Bureau can we hope to attain the desired end; and growers have our assurance that we are ready to carry out, in full, our share of the contract.

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*Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report for the month ended 12th May, 1929:—*

## MACKAY DISTRICT.

### Greyback Grub Injury.

Injury to cane by grubs of this pest is now showing up in many portions of the whole district, and many growers who have never before been troubled with grubs, have reported damage this season. Some farmers with many years' experience in the district state that they have never before seen such extensive grub injury.

Inspections made in affected areas during the past month indicate that from the average condition of the grubs, they will continue to be active at least until the beginning of June, before they commence to burrow down to form their pupal cells. When a grub is "fully fed" it assumes a creamy-yellow colour and loses its glossy appearance; but when active and feeding, the skin is clear and transparent, and the soil that has been ingested clearly shows black through the skin at the anal end of the body. All grubs examined so far have not shown indications of being fully fed, therefore injury is likely to be done to cane for a further period of at least three or four weeks. The creamy-yellow appearance of grubs that have finished feeding is due to fat substances being stored up in the cell tissues directly beneath the skin.

### Distribution of Injury (Summarised).

In the Sarina area, damage is fairly extensive at West Plane Creek, and a number of farms are affected to a more or less serious degree. During the past, growers in that area have been judiciously cutting out feeding trees and collecting beetles, and, although during the last flighting season no large flight of beetles was noted there, the grub damage at the present time is greater than usual. Several farmers in the vicinity of Plane Creek mill are also affected, one or two farms being seriously attacked.

Around Racecourse the damage appears to be more sporadic, and smaller patches are subjected to injury. The worst damage that has come under the writer's notice, and that is close to the mill, is in the Foulden area, where one or two farms along the Pioneer River are fairly badly attacked.

In the Farleigh area, infestation (with the exception of Habana) is also sporadic, and damage is confined chiefly to the elevated lands and hill slopes. Some fairly large "grub patches" are to be seen on several farms. In the other parts of this mill area, Habana is by far the most seriously affected, and of four farms that suffered grub damage and that were inspected in one day, the estimated losses of the total crop in each case was, in descending order of importance, 40 per cent., 17 per cent., 9 per cent., and 7 per cent. The serious loss of 40 per cent. on the first farm may be considered as a very fair estimate, because practically all the cane was growing on hill slopes where the grub patches stood out plainly, covering almost half of the total area under cane. Close examination revealed the fact that a great deal of the cane had already fallen down, and that much more would soon follow.

In general, most of the damage was confined to hillsides and high banks of watercourses.

In the Owen's Creek district, infestation appears to be general and bad throughout. Practically every farm in the area embraced between the end of Owen's Creek railway branch and a distance of some three miles from Garget, shows grub injury more or less badly. On two farms in particular, it reaches serious proportions, one estimate being calculated at being between 35 per cent. and 40 per cent. of the total crop. Much of the cane was down and therefore too far gone for fumigation, and as the cane could not yet be harvested, there would be little chance of saving the stools for ratoons. Beyond Garget and as far as Hatton, grub damage is showing up in patches on many farms. It is, however, chiefly confined to higher ground, but was also noted in one or two instances on perfectly level ground.

Some very bad injury was observed in the Mia Mia district, where several large canefields were almost wholly attacked, and much good cane had fallen over. The losses in this area were individually greater than any others noted in the district.

Around both Marian and Pleystowe mills, quite a number of farms show indications that grubs are at work. Farther out in the Mount Jukes and The Leap areas, which are usually subjected to the ravages of grubs, have not escaped any the less this season. Several growers in these two localities have been fumigating earlier in the season with carbon bisulphide, and have reported very good results therefrom. It is indeed encouraging to receive such reports, for it shows that results have actually obtained in the field, other than in the nature of "experiments."

## Fumigation against Grubs.

As already just mentioned several growers in the two abovenamed districts have been fumigating their cane with carbon bisulphide, and have reported a very good "percentage of killed grubs," and also that the cane treated had recovered from its setback. It is of interest to note from one particular grower's experiences, that he received better results from central stool fumigation than from the usual method of applying the doses of poison to both sides of the stool. The method he employed was to place the injector to the required depth as near as conveniently possible to the centre of the stool, and give one dose directed towards the *opposite* side of the stool, then simply turn the injector round so that the aperature faced the reverse way, and give another dose, facing the operator. Very large stools would receive three doses given equidistantly in the stool.

From this method it was claimed that the grubs being mostly centred directly under, and in the stool, the fumigant was brought more in direct contact with them, and did not have to pass through so much soil, &c., before reaching them. A considerable saving of time was also reported on account of the elimination of going along both sides of the cane rows; by this method both sides being reached whilst going one way along the rows.

## Miscellaneous.

The present degree of grub infestation taken over the district as a whole is considerably greater than that which is usually experienced. That this is clearly so may be inferred from the many reports coming to hand from growers who have previously never been troubled with grubs. It does not necessarily follow that the damage next season will be as great, or greater than that occurring at the present time. Many natural factors such as dry weather, &c., may exert considerable check over next season's emergence of beetles. Prolonged dry weather by hardening the ground, frequently causes many beetles to perish within their pupal cells, the hardness of the ground preventing their free emergence. On the other hand if conditions are favourable and all the beetles emerge, natural insect parasites may check many. It is very often observed that after an apparent scarcity of a particular insect, there follows an unusually large number the next season, and that again this abundance is in turn followed by a scarcity. This is generally attributed to the fact that when the insect in question is scarce, its parasites are also scarce, and when plentiful the parasites have an opportunity of breeding up, which, assisted by numerous other factors, helps to restore natural balance.

In view of the present situation regarding grubs in canefields, it would be advisable to growers who purpose fumigating next season, to note the particular areas subjected to attack at the present time, then to be ready to fumigate early next season—i.e., in January and February. It may be well to mention again that both injectors and fumigant (carbon bisulphide) may be obtained through application to the Secretary of the Mackay District Pests Destruction Board; the latter being supplied to farmers at a very much reduced rate of cost.

## ABSTRACTS AND REVIEWS.

### "FRUIT WORLD ANNUAL."

**A Comprehensive Review of the Australian and New Zealand Fruit Industry.**

The 1929 "Fruit World Annual," a copy of which is just to hand from the publishers, gives a very comprehensive review of the fruit industry in Australia and New Zealand.

In Australia there are 388,000 acres under fruit, yielding an annual value of over £11,000,000. Details and statistics are given in the "Annual" of the area under the various kinds of fruit in the several States, the quantity harvested and the value. Descriptions are also given of the principal fruitgrowing activities in each of the States and in New Zealand.

The various sections of the fruit industry are separately dealt with—dried fruits, jam and canning, the citrus industry, deciduous fruits, cold storage, &c.

On the subject of marketing, full details are given of the facilities in every State, while as regards export the situation is capably reviewed, particulars being given regarding London, Liverpool, Hull, Manchester, Newcastle, Glasgow, and other ports in England and Scotland, together with details of the principal Continental ports so far developed for receiving Australasian fruit.

The need for sending high quality fruit is emphasised, and to be of practical service, twelve pages are devoted to the subject of packing fruit, with numerous illustrations.

One of the most interesting features from the growers' point of view is the series of illustrations in natural colours of principal fruit pests and diseases, complete with effective remedies for the same. Other practical subjects for growers include the planting of fruit trees, manuring the soil fertility, monthly seasonable orchard work and spraying.

A list is given of the Fruitgrowers' Associations throughout Australia, also a list of the fruit cool stores and the capacities thereof. To help growers to be methodical a bookkeeping system is included, together with details for making income tax returns.

For those interested in statistics of area and production, quantities exported, &c., the "Fruit World Annual" will be found very useful. For the grower the various cultural articles and illustrations are of practical value. Our copy is from the publishers, The Fruit World Proprietary, Limited, Melbourne.

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NOMINAL ROLL FOR PLATE 107.

*Back Row.*—A. J. Crees (Engineer, Mossman); F. Keogh (Experiment Station); J. D. Clarke (Engineer, Pleystowe); R. R. Campbell (Manager, Racecourse); — Chappel (Engineer, Babinda); W. F. Clarke (Mill Overseer, Pleystowe); W. Harrison (Chemist, Plane Creek); J. Pollard (Chemist, Racecourse).

*Second Row.*—T. Harrison (Chemist, Proserpine); J. W. Inverarity (Managing Director, Pleystowe); H. E. Turner (Chemist, Tully); E. J. Doig (Walker's Limited); H. Horton (Engineering Supply Company of Australia); J. Mackenzie (Chemist, Marian); J. W. McGibbon (Chemist, Cane Prices Board); F. W. Cameron (Cameron's Limited, Mackay).

*Third Row.*—B. E. J. Martin (Manager, Pioneer); C. Smith (Manager, Cattle Creek); M. B. Davis (Chemist, Kalamia); M. R. Gibson (Manager, Proserpine); M. A. Doolan (Chemist, Mulgrave); Colonel D. E. Evans, D.S.O. (Managing Director, Evans, Deakin, and Company, Limited); Max. Smith (Engineer, Mulgrave); H. G. Goldsmith (General Manager, Walker's Limited); F. W. Heck (Chemist, Rocky Point); R. Clarke (Manager, Pleystowe); R. E. Leek (Chemist, Cattle Creek).

*Front Row.*—C. J. Thatcher (Chemist, Pleystowe); Val Thorpe (Manager, Plane Creek); C. H. O'Brien (Chemist, Mossman); J. O'Neill (Manager, Marian); W. F. Seymour Howe (General Manager, Mulgrave); Miss Wyllie (Typiste); A. J. Barbat (Barbat and Sons, Mackay); N. Bennett (Technologist, Experiment Station); W. Adams (Managing Director, Bundaberg Foundry); W. Thorpe (Engineer, Plane Creek); H. Martin (Chemist, North Eton); W. Pollock (Engineer, Tully); G. H. Thirkell (Engineer, Racecourse).

*Absent.*—S. H. Scougall (Manager, North Eton); W. Mackinnon (Manager, Farleigh); J. Evans (Engineer, Farleigh); W. Emerick (Chemist, Kalamia).

PLATE 107.—QUEENSLAND SOCIETY OF SUGAR CANE TECHNOLOGISTS—FOUNDATION MEETING AT MACKAY, MARCH, 1929.

(See page 404).

# FUNGICIDES AND DISEASE CONTROL.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Three main lines of attack are available to the agriculturist for the control of plant disease. These are: The use of resistant varieties; the employment of special cultural methods; and the application of fungicides.

## RESISTANT VARIETIES.

It has been found that in various crops there may arise from time to time a certain variety or individual which exhibits a marked resistance to a particular disease to which others of the same species are specially subject. This resistance is sometimes the result of an alteration in the anatomical structure of the variety in question which makes it more difficult for infection to take place. For example there may be a thicker outer wall developed by the epidermal cells of the resistant plant. More often, however, resistance is due to physiological factors whose exact nature is usually difficult to ascertain. Some differences in the composition of the cell sap, although so slight as to be undeterminable, may be sufficient to inhibit the growth of the parasite. Resistant varieties can often be improved by breeding and selection, and when suitable commercially their use constitutes the ideal method for overcoming loss from disease. As the resistance is an inherent character of the plant itself, other troublesome control measures can be dispensed with. The growing of wilt-resistant varieties of tomatoes is a case in which a serious fungus disease has to a large extent been overcome by this method. Some varieties avoid disease owing to the fact that they are early or late maturing, and their susceptible period of growth is passed through during that part of the season in which the parasite is inactive. Some useful wheat varieties owe their freedom from rust to this habit.

It should be remembered that, owing to variations in local growing conditions and also probably to the presence of more than one strain of the parasite, a variety may show resistance only in one particular region. Each district has therefore to try out varieties for itself. Also the resistant qualities have to be maintained by careful selection, or otherwise they may be gradually lost. Not only disease resistance, but general vigour and productiveness, can be greatly increased or diminished according to the amount of attention or lack of attention devoted to selection for propagation purposes.

## CULTURAL METHODS.

Control measures involving special cultural practice have two main objects in view—(1) To increase the crop's endurance by supplying it with its optimum conditions for growth; (2) to reduce to a minimum the amount of infectious material present by means of general sanitation and crop rotation.

### Improvement of Growing Conditions.

It is a fact observed by most growers that it is usually the plant showing poor growth which is damaged most by disease. The strong vigorous individual, although attacked, is not the same commercial

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane.

failure, as it is in a better condition to outgrow the effects of the parasite. Moreover, there are some weak parasites which can attack their host only when this is in an unhealthy condition. In attempting to produce a vigorous plant, a rank succulent growth, such as sometimes follows excessive use of nitrogenous manure, should be avoided, since the soft tissues of these plants are often responsible for a more extensive invasion by actively spreading parasites such as the fungus responsible for Irish blight.

The first objective in the control of disease should therefore be an attempt to obtain for the crop its optimum conditions of growth. For this purpose, careful consideration must be given to the drainage and judicious manuring of the land, if this is not altogether suitable for the purpose for which it is required. Good cultivation and if possible irrigation should be practised in order to maintain continuous growth.

The result of inattention to the maintenance of soil fertility can be seen at the present time in the unhealthy condition of many of Queensland's older citrus and other orchards which have been continuously cropped for many years without any attempt at replenishing the soil.

Bad drainage is probably one of the most common sources of trouble, and moreover this condition is not always apparent from a superficial examination of the land, as hardpan or an impervious bar may occur in isolated areas on otherwise well-drained land. Even if not completely killed by asphyxiation, roots subjected to waterlogging may be weakened to such an extent that they become invaded by various fungal and bacterial organisms of the soil which set up a root rot. On the aerial parts various forms of dieback may result from invasion of organisms only able to attack the plant in its weakened condition. Though the primary cause of injury may have been due to excessive accumulation of water, the effect on the plant often does not become evident until some time after this occurred, when the drying out of the soil leaves the plant to feel the effects of a diminished root system.

As several of the fungi attacking the root, crown, and branches of fruit-trees require a wound to enable them to penetrate through the highly resistant bark, care should be taken that injuries are not given during cultivation and pruning. If large branches have to be removed the cut should be made clean and the surface covered with Bordeaux paste.

## Sanitation.

In some cases the grower himself is largely responsible for breeding up a disease on his own farm. Much can be done to keep disease in check by merely following out simple precautions for general cleanliness. As refuse from a diseased crop may be bearing the fruiting bodies and spores of the organisms causing disease, all infected material should be carefully burnt as soon as the crop has ceased to be productive. If the disease is observed to be starting in a small area, its spread may sometimes be checked by immediate destruction of the affected plants. Care should be taken that disease is not carried from infected to healthy areas by means of contaminated clothes, boots, pruning tools, &c.

Rotation of crops will allow parasitic organisms to die out of infected fields, and should be practised whenever possible. Rotation is especially necessary in the case of such fungi as species of *Fusarium* and *Rhizoctonia*, which are often able to maintain a saprophytic existence on dead organic matter in the soil and will from this pass to a suitable living

host should one become available. Such fungi can often retain their soil existence for considerable periods, and if possible allowance should be made for at least a three-year interval between plantings of a crop susceptible to a disease with which the field has become infected.

A seed-bed should always be located on land near which the particular crop or a closely related one has not been grown previously, and if virgin soil can be used so much the better. If a suitable site is not available and the crop is one subject to soil-borne diseases, sterilisation of the bed may be resorted to.

Disease may be introduced into a clean area on infected seed or by using cuttings, &c., from diseased plants. Examples of this are seen in the introduction of potato scab by the use of infected sets, and in the spread of Panama disease of bananas by planting suckers from diseased stools. If possible, seed, cuttings, tubers, &c., should be obtained from a district in which disease is not known to be present. If contamination is suspected, various methods of sterilisation may be practised. This is advisable as a routine procedure with those crops subject to seed-borne disease.

## DIRECT CONTROL BY THE APPLICATION OF FUNGICIDES.

As was pointed out in Chapter 4, the development by fungi of an ectoparasitic and endoparasitic habit of growth opens up two methods for their destruction. Ectoparasitic fungi, living as they do on the surface of their host, can be killed by direct contact with a suitable fungicide. For this purpose, sulphur applied in the form of a dust or as sulphur compounds in solution has proved most useful. Under warm conditions the sulphur reacts with the oxygen and water vapour of the air to produce a volatile compound to the action of whose fumes the mycelium of the fungus quickly succumbs. The class of diseases known as the powdery mildews are treated by this method. The endoparasitic parasites once within the tissues of their host are safely sheltered from the effect of fungicidal applications. To control such invaders it is necessary to get in early and prevent infection from taking place. For this purpose all the susceptible parts of the plant must be covered with a thin film of poison which, while it is not injurious to the plant itself, will affect the fungus to an extent that will prevent the germ-tube put forth by the developing spore from penetrating the surface. Owing to their protective outer covering, it is not usually possible to kill the spores themselves before germination without using a spray too strong for the plant to stand. Various copper compounds have been found to give the best results in resisting the attack of endophytic fungi. The most commonly used of these fungicides are Bordeaux and Burgundy mixtures. When properly prepared these will not injure the plant, nor are they sufficiently poisonous to be harmful should sprayed fruit be consumed with the chemical still present.

The copper fungicides are usually applied in the form of a wet spray. Of recent years there has been a tendency in some countries to apply the poison in the form of a dry powder as a dust. Reports of the results obtained from dusting as compared with the wet spray are rather conflicting, but dusting on the whole would appear to be a less effective method, especially during a season of heavy rainfall.

The advantages of the dust over the wet spray are—

(1) The ease and rapidity with which a dust may be prepared and applied reduces labour costs.

(2) The apparatus used is less costly and lighter to work with.

(3) No water is needed, which is a consideration in some localities.

The chief disadvantages are—

(1) The results obtained from dusting are often not equal to those obtained from the application of a wet spray.

(2) In order to obtain proper covering it is necessary to dust when the air is comparatively still. If the surface of the plant to be treated is at all shiny, moisture must be present to ensure adherence.

(3) The adherence of a dust is not usually as great as that of a spray, which necessitates more frequent applications.

Reliable copper dusts applied under suitable conditions should give a control sufficient, when the other advantages are taken into consideration, to justify their use. Unfortunately these necessary conditions are not to be had to order, and in the present state of knowledge regarding dusting this procedure cannot be recommended as a universal substitute for the wet spray. It should be noted that the above remarks do not apply to dusting with sulphur, which has been proved to be very effective for the purposes for which it is employed. The difference is that sulphur acts by reason of the fumes which it gives off, and complete covering and long adherence are not of such paramount importance.

To obtain best results from a minimum expenditure of the material, the spraying machines should be capable of delivering the fluid at high pressure through a suitable nozzle so that a fine mist-like spray is produced. This will give a more even and thorough coating than the coarser spray of the low-pressure pump. Spraying on showery or wet days should be avoided as far as possible, as several hours is necessary for a spray to dry thoroughly and retain its lasting properties.

Care should be taken that the crop is well covered with spray during moist or muggy weather, as atmospheric conditions of this nature are very suitable for spore germination and are thus conducive to the spread of most fungus diseases. Hot dry days usually serve as a check to disease, and the delicate spores of many fungi become quickly desiccated during such times.

The number of different specifics which have from time to time been advocated for the control of various diseases is considerable. There are, however, a few which have a more or less general application and which have stood the test of long usage. The more important of these will be shortly described below.

## Bordeaux Mixture.

This spray is probably the most widely used fungicide at the present day. It consists of a somewhat indefinite mixture of copper compounds, including basic sulphates, in which the copper has been precipitated until practically none remains in solution. The spray is therefore non-injurious to the plant, since the injurious copper salts cannot be absorbed into the tissue of the living organism unless in the soluble form. Minute quantities are, however, dissolved by the acids of the plant juices, and these are sufficient to prevent fungus infection. The poison in these minute doses also acts as a stimulant to the plant itself, and thereby promoting a more vigorous growth aids it in resisting the invasion of the attacking parasites.

*Formula.*

| | |
|---|---|
| Bluestone (copper sulphate) .. .. .. | 6 lb. |
| Burnt or quick lime .. .. .. .. | 4 lb. |
| Water .. .. .. .. .. .. | 40 galls. |

This is briefly referred to as a 6-4-40 formula.

Dissolve the bluestone in half the required amount of water in a wooden or copper vessel. If crystals are used, this is best done by tying them in a piece of sacking which is left suspended in the top of the water overnight. Powdered bluestone can now be obtained, which dissolves very readily. Only wooden or copper vessels can be used to contain the bluestone solution, as this chemical will quickly eat through iron. Wooden casks form convenient receptacles.

Slake the lime in another vessel by the gradual addition of small quantities of water, when the heat generated will aid the reaction. After slaking is complete, water is added to make up the remaining half of the total required. Only best freshly burnt lime should be used, as otherwise there is likely to be an excessive amount of useless residue, and the final composition of the spray will be affected. If burnt lime is not available, good-quality hydrated (not air-slaked) lime can be used, but half as much again is required. It is usually difficult to prevent burnt lime from becoming air-slaked in moist climates, but this difficulty may be overcome by slaking the lime before it deteriorates, and keeping under water. For convenience in using later, store a known amount in a known volume of water.

The two solutions, bluestone and lime, are poured simultaneously through a fine strainer into a third container, or the spraying vessel and the mixture stirred well for a few minutes. This method gives a fine gelatinous precipitate which does not readily settle out. If necessary, one solution can be poured directly into the other, provided the latter is kept well stirred during the process. Concentrated solutions should not be mixed before dilution, as the resultant precipitate tends to be of a granular formation and its spreading and adhesive properties are poor. For the same reason the two solutions should be quite cold before mixing. Bordeaux mixture should be used as soon as possible after preparation, as it loses its gelatinous nature after several hours' standing and settles out in the granular form.

It sometimes happens that the lime used is of poor quality and the resultant mixture may then contain an excess of bluestone. This must be avoided, as the soluble copper salt is able to cause injury to the plant sprayed. An excess may be tested for by applying blue litmus paper (obtainable from a chemist) to the layer of clear liquid on the top of the spray. If the colour of the paper turns to red, more lime must be added until there is no change. A rough test is given by allowing a clean knife-blade or bright iron nail to remain in the mixture for a few minutes. If on removal this shows a brown coating of copper, more lime is required.

If a crop is to receive frequent and regular applications throughout the season, as is required for many of the foliage diseases, the above formula can be reduced to one consisting of 4 lb. of bluestone and 4 lb. burnt lime to 40 gallons of water. It is necessary to still further reduce the bluestone content for a summer spray for certain deciduous fruit-trees.

It is sometimes found convenient to make up a stock solution of bluestone and lime: 50 lb. of bluestone is dissolved in 50 gallons of water in a wooden vessel; 50 lb. of quicklime is slaked and water added to make up to 50 gallons. The solutions will keep well if protected from evaporation. One gallon of each will contain 1 lb. of bluestone or lime respectively, on which basis the necessary dilution before mixing for the preparation of any quantity can easily be calculated.

Certain proprietary mixtures, usually in the form of a paste or powder, are now on the market, for which it is claimed that they will form Bordeaux mixture on addition of the required amount of water, thus doing away with the trouble of preparing the home-made article. There are, however, some disadvantages in the use of these mixtures—

(1) They are usually more expensive than the home-made spray.

(2) The exact composition varies with the different makes, and it is therefore sometimes difficult to prepare a mixture of definite strength.

(3) It is found that some of the ready-mixed powders do not give such a fine suspension as the home-made mixtures, so that their spreading and adhesive properties are poorer.

However, if a reliable brand is obtained, these mixtures serve a useful purpose for the treatment of a crop for which it is not desired to acquire the apparatus necessary for home mixing.

Lead arsenate and nicotine sulphate may be added to Bordeaux mixture to give a spray combining both fungicidal and insecticidal properties.

### Bordeaux and Oil Emulsion.

This spray has been recommended largely for spraying citrus trees. The addition of the oil has two advantages. In the first place it acts as a spreader giving a better covering. Also it exerts a controlling influence on scale development, and thus counteracts to a certain extent the disadvantages sometimes arising from the killing of entomogenous or insect-destroying fungi by the Bordeaux itself.

Take of a good brand of red oil an amount equal to 1 per cent. of the total volume of spray to be used. Emulsify this thoroughly in one to two times its own volume of water, and then stir well into the mixed Bordeaux. Care must be exercised that the oil is well emulsified before adding to the Bordeaux.

Concentrated kerosene emulsion may be used in place of red oil, the amount used being calculated on the total kerosene present.

### Bordeaux and Resin Sticker.

For use in districts subject to heavy tropical rains the adhesive properties of Bordeaux mixture may be increased by the addition of a resin mixture.

Dissolve 1 lb. of washing soda in 1 gallon of boiling water. Then add 2 lb. of resin, which may be crushed into small particles, and boil until the mixture is clear. One gallon of this when cool can be added to every 25 gallons of Bordeaux spray.

### Bordeaux Paste.

This is often useful for painting wounds, pruning cuts, &c., to prevent the invasion of rot-producing organisms.

Slake 2 lb. of quicklime in ½ gallon of water. Dissolve 1 lb. of bluestone in another ½ gallon. Mix equal quantities of the two solutions to give the amount of paste required.

### Burgundy Mixture.

This spray is more favoured than Bordeaux by some growers, as it is somewhat easier to prepare and can be used when good quicklime is not available. There is little to choose between the fungicidal values of the two mixtures when properly prepared.

*Formula.*

| | |
|---|---|
| Bluestone | 6 lb. |
| Washing soda | 8 lb. |
| Water | 40 galls. |

This can be reduced, when spraying is to be frequent, to a 4-5¼-40 formula. The preparation is essentially the same as in the case of Bordeaux, using the washing soda instead of lime.

The washing soda may contain impurities, and it is therefore necessary to test for excess bluestone as in the case of Bordeaux. As an excess of soda, unlike lime, is known to cause injury in some instances, it is advisable to test the mixture with both red and blue litmus papers. If the blue paper is turned red, an excess of bluestone is present and more soda is required. If the red paper quickly turns a definite blue, too much soda has been used and more bluestone solution should be stirred in slowly until there is no colour change in the litmus.

### Ammoniacal Copper Carbonate.

Bordeaux and Burgundy mixtures both have the disadvantage in that they leave a bluish-white covering over the surface sprayed. Ammoniacal copper carbonate, while somewhat inferior to these as a fungicide, can be used on fruit approaching maturity, since it is a clear solution leaving no stain.

*Formula.*

| | |
|---|---|
| Copper carbonate | 5 oz. |
| Strong ammonia | 3 pints |
| Water | 40 galls. |

Make the 5 oz. of carbonate of copper into a paste by the addition of a pint or two of water.

Add the 3 pints of concentrated ammonia to about 2 gallons of water in order to make the solution easier to handle.

Stir the copper carbonate paste into the ammonia water until dissolved or until no more will go into solution.

Add water to make up to 40 gallons.

### Lime Sulphur.

Lime sulphur, next to Bordeaux and Burgundy, is probably the most valuable fungicide at present in use. It is even more efficient than sulphur itself in the destruction of ectoparasitic fungi, the mycelium of which is destroyed by the fumes given off by certain of the sulphur

compounds contained in the spray. Used as a protective spray against the invasion of endoparasites, lime sulphur is less efficient than the copper preparations. Weighing against this disadvantage is the fact that lime sulphur has considerable insecticidal value in the destruction of scales and mites. It therefore can be used with advantage when spraying with Bordeaux would cause the destruction of the scale insect destroying fungi, leading to an increase of the insect pests. Lime sulphur can often be used as a summer spray for certain deciduous trees which would be injured by Bordeaux.

Lime sulphur can be bought in the concentrated form ready prepared, or can be made in the orchard. The latter procedure is the more economical for large holdings.

Formula for home-made lime sulphur:—

| | |
|---|---|
| Flowers of sulphur .. .. .. .. | 100 lb. |
| Good burnt lime .. .. .. .. | 50 lb. |
| Water .. .. .. .. .. .. | 50 galls. |

About half the water is placed in an iron vessel and brought to the boil. The lime is stirred in while this is heating. The sulphur is then mixed into a paste and added, and the vessel stirred until the lime is slaked and the contents well mixed. The rest of the water is poured in and the mixture boiled for three-quarters of an hour to an hour but not longer. The orange-red liquid is strained from any sediment and stored in an airtight container.

The composition of the home-made lime sulphur and also some of the commercial brands varies considerably. Any grower using the spray in quantity should therefore test the strength of the concentrated solution before diluting for spraying. This is done by using a Baumé hydrometer, from which the density of the solution is read off in degrees Baumé. The strengths to be used for various applications are usually specified for lime sulphur of a 33 deg. Baumé as standard. The accompanying chart, adapted from that supplied by J. A. Campbell in the New Zealand "Journal of Agriculture," will enable sprays of correct dilution to be prepared from lime sulphur concentrate of various densities. First determine by means of a Baumé hydrometer the density of the lime sulphur to be used. Find the corresponding degree of density in the left-hand column. The figure in the same horizontal line in the column headed by the dilution required will give the amount of water to add to one part of the stock concentrated solution in order to give this dilution.

| Density of Stock Solution in Degrees Baumé. | Dilutions Required, based on a 33° Baumé Standard. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 to 10. | 1 to 15. | 1 to 20. | 1 to 30. | 1 to 40. | 1 to 80. | 1 to 100. | 1 to 120. |
| 25° .. .. .. | 7·6 | 11·4 | 15.2 | 22·7 | 30·3 | 60·6 | 75·8 | 90·9 |
| 26° .. .. .. | 7·9 | 11·8 | 15·8 | 23·6 | 31·5 | 63·0 | 78·8 | 94·5 |
| 27° .. .. .. | 8·2 | 12·3 | 16·4 | 24·5 | 32·7 | 65·5 | 81·8 | 98·2 |
| 28° .. .. .. | 8·5 | 12·7 | 17·0 | 25·5 | 33·9 | 67·9 | 84·8 | 101·8 |
| 29° .. .. .. | 8·8 | 13·2 | 17·6 | 26·4 | 35·2 | 70·3 | 87·9 | 105·5 |
| 30° .. .. .. | 9·1 | 13·6 | 18·2 | 27·3 | 36·4 | 72·7 | 90·9 | 109·1 |
| 31° .. .. .. | 9·4 | 14·1 | 18·8 | 28·2 | 37·6 | 75·2 | 93·9 | 112·7 |
| 32° .. .. .. | 9·7 | 14·5 | 19·4 | 29·1 | 38·8 | 77·6 | 97 0 | 116·4 |
| 33° .. .. .. | 10·0 | 15·0 | 20·0 | 30·0 | 40·0 | 80·0 | 100·0 | 120·0 |
| 34° .. .. .. | 10·3 | 15·4 | 20·6 | 30·9 | 41·2 | 82·4 | 103·0 | 123·6 |
| 35° .. .. .. | 10·6 | 15·9 | 21·2 | 31·8 | 42·4 | 84·8 | 106·1 | 127·3 |

Lime sulphur as a winter spray for deciduous trees, or as a winter dressing for the trunk and branches of citrus, can be used at a dilution of 1 to 10 or 1 to 15. At 1 to 40 it can be used as a general summer spray for citrus. As a summer spray for deciduous fruits, dilution of from 1 to 80 to 1 to 120 becomes necessary.

It may be advisable to increase the spreading qualities of lime sulphur by the addition of a casein spreader.

## Sulphur.

Sulphur applied as a dust is used extensively for the control of the powdery mildews caused by species of the Erysiphaceæ.

Sulphur dust may usually be obtained in two forms—

(1) Ground sulphur consisting of lump sulphur ground to a powder of varying degrees of fineness.
(2) Sublimed or flowers of sulphur formed by the condensation of sulphur vapour obtained by burning ordinary sulphur.

Sublimed vapour is often finer than many of the commercial brands of ground sulphur, but it possesses the disadvantage of containing small quantities of free sulphuric acid which may cause some foliage-burning and also make the application disagreeable to the operator. Ground sulphur is quite equal to flowers of sulphur when in the same state of division. It loses its bright yellow colour with increased fineness, and good ground sulphur should always be a lighter yellow than the sublimed form.

Fineness of the particles is of the greatest importance, as it confers on the sample greater covering power with more even distribution and better adherence. Fine division is also conducive to greater evolution of the fumes to which sulphur owes its fungicidal properties.

Lime to the extent of 25 to 50 per cent. is sometimes added to the sulphur. This enables a more thorough application to be made than would otherwise be economically possible. It also reduces the chance of burning should the sulphur contain an excessive quantity of free acid.

A still warm day should be chosen for sulphuring, and if the dust is applied while the dew is still on the leaves better adherence will be obtained.

## Disinfectants.

The use of disinfectants may be necessary for the sterilisation of seeds of plants subject to seed-borne disease, or the vegetative parts such as tubers, suckers, &c., used for propagation purposes. Seed-beds are also treated with advantage if the ground is suspected of harbouring disease.

Seed disinfection is especially desirable when planting crops liable to seed-borne disease on new land or land that has received rotation. The danger of introducing disease to a clean area by means of contaminated seeds is thereby lessened.

The chemicals commonly employed for the purpose are corrosive sublimate (mercuric chloride) and formalin (40 per cent. solution of formaldehyde).

Owing to the great variation exhibited by these disinfectants in their action on different seeds and fungus spores, no general method can be given for their use. Corrosive sublimate is commonly used at a

strength of 1 part in 1,000, i.e., 1 oz. to 6¼ gallons of water. Small quantities of solution are more easily prepared by the use of tablets obtainable from a chemist. The solution will corrode metal containers, which have therefore to be avoided. The time of immersion varies with the variety of seed employed from about five minutes to half an hour. When treating tubers, cuttings, &c., longer periods can be used. Great care must always be taken when working with corrosive sublimate, as this chemical is a deadly poison.

Formalin is used at a strength varying from ½ per cent. to 2 per cent., depending on the time of immersion and the material to be treated. To make a 1 per cent solution, add 1 oz. of formalin to 5 pints of water. Other strengths may be calculated from this. The time of immersion varies as in the case of corrosive sublimate.

For these treatments seed is conveniently handled by tying in cheesecloth or a similar open material.

A certain amount of seed injury or retardation of germination sometimes follows disinfection. This undesirable result can largely be eliminated by soaking the seeds in water before immersion in the disinfectant, and washing for five to ten minutes in several changes of clean water after treatment. The pre-soaking provides for less absorption of the poisonous fluid into the interior of the seed, while the subsequent washing removes any injurious compound which might continue its action after removal from the main supply. The seed after washing should be spread out to dry, and then sown as soon as possible.

In Europe and America certain organic mercury compounds are now available for seed disinfection which are proving in many cases superior to the chemicals used in the older methods.

## Soil Sterilisation.

By far the best method for carrying out soil sterilisation is by means of steam. This is, however, impracticable for the average grower. Small areas of ground such as seed-beds may be sterilised by means of formalin. The beds are prepared ready for planting and then watered with formalin solution of 1 to 2 per cent. strength at the rate of 4 gallons to the square yard. The beds as soon as treated are covered with sacking, &c., for a few days to keep in the fumes, and then after airing for about a week are ready for use.

When diseases such as damping-off make their appearance after planting, the spread may often be checked by the application of a mixture known as Cheshunt compound. It is prepared as follows:—

Two ounces of powdered bluestone (copper sulphate) is mixed thoroughly with 11 oz. of crushed and powdered rock ammonia (carbonate of ammonia). This stock mixture should be kept in a stoppered bottle. It is dissolved in water at the rate of 1 oz. to 2 gallons, and the solution then watered on the soil so as to thoroughly wet it. The solution can be held in wooden or copper vessels only.

*JOURNAL APPRECIATED.*

*A Kingaroy farmer writes* (13/4/29):—*I wish to express my appreciation of the Queensland Agricultural Journal, which I look forward to every month.*

## QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Water Gum (*Tristania laurina*) is most commonly found in forests along watercourses. The picture of the stem of the tree shows the pattern of the bark. The wood is very finely grained, and is pale or brownish in colour. It is fairly heavy. In the "Queensland Flora" it is stated that the wood is useful for tool handles. The species is found as far north as Gympie in Queensland, and extends into Gippsland in Victoria.

*Photo.: W. D. Francis.*]

PLATE 108.—WATER GUM (*Tristania laurina*).

A tree in the Rain Forest of Robert's Plateau, Macpherson Range. The tree on the extreme left is the Scrub Box (*Tristania conferta*).

*Photo.: Dept. Agriculture and Stock.*]

PLATE 109.—WATER GUM (*Tristania laurina*).
A. Flowering shoot; B. Capsule-bearing shoot.

## QUEENSLAND SHOW DATES, 1929.

The following is the official list of Queensland Show Dates for 1929, as issued by the Queensland Chamber of Agricultural Societies:—

Bundaberg: 13th to 15th June.
Bororen: 17th and 18th June.
Gatton: 19th and 20th June.
Gladstone: 19th and 20th June.
Mount Larcom: 21st and 22nd June.
Buderim Mountain: 22nd June.
Rockhampton: 26th to 29th June.
Esk: 28th and 29th June.
Wynnum: 30th and 31st June.
Mackay: 2nd to 4th July.
Kilcoy: 4th and 5th July.
Townsville: 9th to 11th July.
Woodford: 11th and 12th July.
Home Hill: 12th and 13th July.
Samford: 12th and 13th July.
Woombye: 12th and 13th July.
Charters Towers: 17th and 18th July.
Caboolture: 18th and 19th July.
Ingham: 19th and 20th July.
Rosewood: 19th and 20th July.
Barcaldine: 23rd and 24th July.
Laidley: 24th and 25th July.
Nambour: 24th and 25th July.
Ayr: 26th and 27th July.
Bowen: 31st July and 1st August.
Maleny: 31st July and 1st August.
Nundah: 3rd August.
Royal National: 12th to 17th August.
Crow's Nest: 21st and 22nd August.
Goombungee: 30th August.
Malanda: 18th to 19th September.
Pomona: 18th and 19th September.
Kenilworth: 28th September.
Rocklea: 28th September.
Pine Rivers: 15th and 16th November.

# RURAL LIFE IN OTHER LANDS.

BY THE EDITOR.*

Some years ago, when looking around post-war Europe, visiting different countries, seeing something and learning something of the ways of life, of the customs and accomplishments and general racial characteristics of other peoples—it was a very liberal education, by the way, especially for an Australian—one was everywhere impressed with the density of rural populations and the intensity of cultivation on soils that seemed to a Queenslander hungry enough to turn a bandicoot into a bolshevik. One thought naturally what a country Australia would be, what a State Queensland would be, if it only had a country population of a tenth part of the numbers that inhabit the rural regions of Western Europe.

## Racial Resemblances.

Another thing that struck one was the physical similarity of the Continental races, and despite the dicta and dogma of pro-Nordic enthusiasts, there was, or it seemed to me on appearances anyhow, very little difference among the several races besides language, customs, mentality, and creeds.

In the far north of Scotland, in Caithness and Sutherlandshire, one was privileged to meet people of the pure Scandinavian type, whose family names were, obviously, of Norwegian, Swedish, or Danish origin. In Sweden, Norway, and Denmark, and parts of Germany one would meet with types almost exactly similar to those one met in Scotland. In Ireland and Wales one could observe many points of similarity, from the racial viewpoint, with Bretons and other French people of the Biscayan and Mediterranean provinces.

The same points of resemblance were noted as regards British people, Dutch, Belgians and, to a lesser extent perhaps, Italians, of the northern provinces of Italy particularly. In all these countries the Nordic strain seemed to be strong, that is if one could judge by the number of blonde Italians, Frenchmen, and others one met with; while on the other hand the swarthiness of many Englishmen, Scotsmen, Irishmen, and Welshmen, and the Continental races was often very strongly in evidence. Perhaps no better opportunity was ever given the student of humanity—of the white races particularly—than that afforded him in France during the war. There could be met the representatives of every European race, and every type of each race drawn from a variety of home and overseas environment; and beyond manners, dress, and speech, there did not seem very much to distinguish them. One of the finest physical specimens of manhood in the mass I ever saw, by the way, was a reserve division of the French Army drawn from the Alpine Provinces—all picked men, of course, none younger than twenty-five and none older than thirty-five.

When you come to think of it, however, the resemblance of one European race to another is not very remarkable. The Romans (the Italians of the time) occupied Britain for three centuries. Northern peoples, at times, swept down through France and Italy. Vikings invaded Scotland, and the Danes and Normans, descendants of the old predatory Norsemen, invaded England and Ireland. Then, of course, there were the people, the Huguenots and Flemings, for instance, who sought sanctuary in the British Isles; and also those of the British Isles, who, in times of political stress, sought a similar sanctuary on the Continent. In addition, there were the peaceable comings and goings of the several peoples, which despite distance and indifferent transport must have been always going on. The distance from England to France was after all no further than from, say, Wynnum to Cape Moreton, and at one point, Dover to Calais, not much further, if as far, than from Brisbane to Bribie.

This, however, is not a talk on racial problems or racial distribution. In these few opening remarks it is my purpose to suggest merely that, after all, there is much in common between the several European countries. The struggle for existence is the same everywhere and is just as keen in one country as another. Their rural life is more or less common in its simplicity; its very practical endeavours; its sound husbandry, varied, of course, in its evolution from local environment; and, socially speaking, its more or less neutral tints.

## A Glance at Rural France.

It is always interesting to look over the other fellow's work when interests are common, to go through his paddocks to see what he has done and how he has fared; and with that idea it is proposed to take a rapid glance at rural France, the

* From a series of radio lectures through 4QG.

Continental country one knows best of all, and, perhaps from a temporary very close association with its thrifty and kindly peasant people, one appreciates best of all, as the first scene in our survey of rural life in other lands.

France is essentially an agricultural country. In 1911, 55.8 per cent. of the inhabitants lived in rural districts and in towns and villages of less than 2,000 inhabitants. There, as elsewhere in the world, is a steady drift from the countryside to the city. This drift has been going on for the last 130 years, intense industrialism being the main cause. Agriculture, however, is still the predominant industry in France, over 40 per cent. being engaged directly in farming. This cityward trend of rural population has become a very serious thing in a country of a very slowly increasing or static population. In any country where the general rate of increase is rapid, such a condition could not create alarm, for marching with the city expansion country districts would in the ordinary course receive a healthy addition in absolute numbers.

Agriculture in France suffered the greatest relative reduction in actual numbers, and probably the greatest reduction in physical well-being of any industry, during the war operations, and since the war the young men have been abandoning the rural districts, so that farm work to-day is being left more and more to women, old men, children, and disabled ex-soldiers.

In 1920-21, the situation became very acute, and foreign labour, Italians largely, had to be brought in to cope with the shortage of labour in the agricultural areas. During the war France lost 1,636,000 of those engaged in war operations. In addition, deaths among civilians exceeded births by 944,000—nearly a million more to add to the awful deficit—and that number does not include, for the period, the figures for Alsace-Lorraine. In 1919, there were 233,000 excess civilian deaths in France, including Alsace-Lorraine. Thus, France entered upon reconstruction at the beginning of 1920 with a loss of population approximating at least 2,813,000—nearly 3,000,000 deaths, most of which made up the frightful price of freedom paid in human life. Probably two-thirds of this number represented effective man power, and farm labour was depleted through these losses of man power. The depletion of farm labour is not indicated alone by the actual numerical decrease in farm population, for, according to recent reviews, the effectiveness of men still living in rural communities is lessened because of disease and mutilations incidental to the war.

Various estimates have been made of the devastation in the war zone, though, of course, the limits of the area affected by war operations varied from time to time. The maximum area invaded is estimated at 10,514,325 acres, about a thirteenth part of the country, of which 8,242,989 acres were occupied for a long time. The area of devastated agricultural country in the war zone exceeded 4,750,000 acres; and losses of livestock in the ten occupied Departments exceeded 50 per cent. of the 1909-1913 average.

Outside the war zone lack of man power forced millions of acres out of cultivation, and Government requisitions reduced French herds by millions of animals.

### How Changing Economic Conditions were Met.

Coming back to generalisations, consciously or unconsciously the French farmer has exhibited marked acumen in his adjustments to the changing economic conditions throughout the world during more than three-quarters of a century.

The world market was flooded with cheap cotton from America and the French farmer abandoned his fields of flax and hemp and restricted his production of fibres, as cheap factory-made cotton goods replaced homespun woollens and linens. The world market was flooded with wheat and the French farmer intensified live stock production. The world market was flooded with wool and the French farmer emphasised meat production. The world market is now, or was until recently, being flooded with frozen beef, mutton, and pork and the French farmer is manifesting a tendency to concentrate on dairy production.

### Agricultural Development Determined by Economic Expediency.

In France, more than in any other country in Europe, trends in agricultural development have been determined by economic expediency. Wheat acreage was abandoned not so much because wheat production in France was less profitable, but because there was greater profit in animal husbandry, and for thirty years before the war wheat areas and the production of animal products fluctuated with the variations in the ratio of the price of bread to the price of meat in Paris.

The intensification of animal husbandry took the form of improvement in weight and quality of marketed animals, and although the records of milk production are fragmentary export data indicate a similar expansion of the dairy industry. More and better feeding stuffs were in demand.

During the twenty-one years preceding the war, the production of field crops largely for home consumption and for feeding to live stock became an established farm policy. Cereals came to occupy a minor place among the marketable surpluses of the farm, which for the most part took the form of milk, butter, cheese, eggs, poultry, and wool, with an occasional animal taken to town on market days. Just before the war the sales of animals and animal products accounted for 70 per cent. of the cash income of the typical middle-sized French farm.

Not only had the acreages under wheat and other cereals become restricted, but there was a marked decrease in the acreage of industrial plants and all other field crops except fodder and forage. An outstanding phenomenon of this period was the marked expansion of grazing areas. France was surely going to grass; but was doing so through an intensification of agriculture on the best lands and the abandonment to permanent pasture of the hungrier country which had not proved sufficiently profitable to continue to cultivate.

These changes from extensive field-crop production to intensive animal husbandry was a response to the effect of the economic factors involved in profit and loss, but they were also intensified and hastened by a city-ward movement of country population.

In a country like France, in which for a decade or more before the war the population had been practically static and immigration limited, the rapid growth of cities could take place only at the expense of rural communities and to the detriment of agriculture.

In the next lecturette of this series other trends of agriculture in France, which may be useful in a consideration of some of our own rural problems in Queensland, will be briefly discussed.

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*Photo.: Dept. of Public Instruction.*]

PLATE 110.—A COUNTRY SCHOOL IN QUEENSLAND.

The children attending our country schools are often keen gardeners, and this picture shows the beautiful results of well-guided enthusiasm.

# REMOVAL OF COTTON STALKS.

W. G. WELLS, Director of Cotton Culture.

The removal of the cotton stalks at the end of the harvesting operations has constituted something of a problem to the average cotton-grower in Queensland. In the course of the early stages of the present revival of cotton-growing several plans were tried varying from cutting the plants by hand with either cane knives, large sharpened eye hoes, or grubbing hoes, to mowing them down with the ordinary mowing machine. All methods were more or less unsatisfactory, and most growers finally resorted to either ploughing the old crop under when they performed the regular ploughing operations, or ploughing out the plants with a shallow setting of a one-disc plough and then forking the uprooted plants into piles and burning them.

Both of these latter methods are not desirable for several reasons. Generally speaking, little or no rain occurs during the late winter and early spring months, and under such dry conditions it is exceedingly difficult to prepare a compact seed-bed where any cotton plants are turned under in the ploughing operations. Where the seed-bed is of an open nature, it is often impossible to obtain a satisfactory permanent strike if only light planting rains occur. The grower in such a case is then faced with the problem of deciding if it is better to prepare for a replant or to carry on with what stand he has and not gamble on the occurrence of further rain in time for another planting. Generally, he decides in favour of leaving it, and many crops are seen each season with very poor stands, which will prevent the grower from obtaining the maximum possibilities of his soil no matter how well he farms it. In fact, one of the outstanding causes of the large number of low yields which occur every season is the failure of many growers to obtain anything approaching a good commercial strike. If each grower would only endeavour to obtain a perfect 2-foot spacing over the full length of, say, twenty adjacent rows in any part of his field selected at random, it is believed the results would be so surprising that much greater attention would be paid to every factor which has a bearing on obtaining and maintaining a perfect stand.

Another point which makes it undesirable that the old cotton plants be either ploughed out and then forked up or ploughed under in the regular soil-breaking operations is the prevalence of certain insect pests of cotton in Queensland. Two of these over-winter in the bolls, and any operation which ploughs them under the soil does not necessarily destroy them. These insects are the peach grub (*Conogethes punctiferalis* Gn.) and the pink boll worm (*Platyedra gossypiella* Saunders). The former occurs in all of the coastal and Southern areas, while the latter is found in the coastal areas north of Maryborough and in the inland valleys of Central Queensland. The caterpillars of both insects can do serious damage, as many cotton-growers in the coastal areas can testify, and all growers should make every effort to obtain as thorough a clean-up as is possible.

Experiments in recent years by growers and on the Callide Cotton Research Station have demonstrated that a machine can be made which will cut off the cotton plants and leave the land in such a state that the plants and most of the bolls can be easily cleaned up and burned. This machine is only a modification of the ordinary maize slide-cutter, and any grower can construct one at small cost.

The accompanying illustrations show a light one-row machine, which was constructed from bush timber, and a two-row machine. The former one was made by Mr. W. Fuller, of the Wowan district, who has used it for the last couple of seasons. The efficiency of the machine is clearly demonstrated by the fact that each season he has many requests for the use of it by his neighbours. Up to 6 or 7 acres of cotton plants can be cut in a day with this machine drawn by one average-sized horse. The experiences of this grower and his neighbours would indicate that such an implement is entirely suitable for a crop of moderate area.

The two-row machine was designed on the Callide Cotton Research Station, and represents a solidly constructed implement which can be drawn by a team of horses or by a tractor. At the Research Station, up to 13 acres can be cut in an eight-hour day with a tractor, even in plants of around 5 to 6 feet in height.

The same features are included in both of these machines, only, two rolling coulters and two 6-feet knife blades are required in the large machine, where only

one of each is necessary in the smaller one. It was found that some steadying effect was necessary to assist in keeping either machine going in a smooth, straight line, and this was best accomplished by means of the rolling coulter used on a plough. In the one-row machine it is attached on the back of the main beam which is drawn down the centre between two rows; the angling arm, with the knife attached, runs against the row of plants to be cut, thus pressing the knife against the base of each plant at the ground level. The coulter is set on top of the beam over a long slot in it, so that some 4 inches runs in the ground and thus prevents any sliding off to the side by the machine when the blade presses against the plants. The two illustrations of the two-row machine show how the coulters and blades are attached to it.

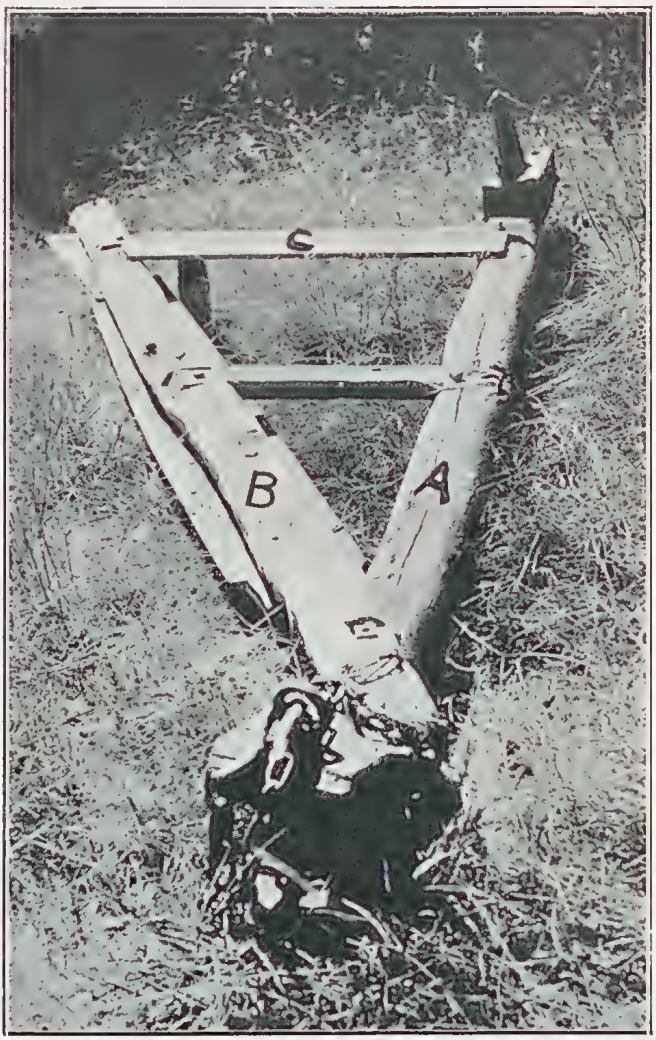


PLATE 111.—ONE-ROW SLIDE CUTTER.

Length of A, 10 feet. Length of B, 9½ feet. Length of C, 4 feet. Knife made of worn-out crosscut saw, and is fastened on lower side of B by means of bolts and a full-length piece of 4-inch by 1-inch hardwood. The latter braces the saw and thus prevents the soil from bulging it between the bolts when the machine is being dragged along the row. Diameter of coulter at end of A is 15 inches. Bearings of hardwood.

PLATE 112.—SLIDE CUTTER.*

An adaptation of the old-fashioned maize cutter, for cutting cotton plants. The box at the rear is a guard over two rolling coulters, which serve to steady the machine so that it cuts more efficiently.

PLATE 113.—REAR VIEW OF SLIDE CUTTER.†

Showing the method of attaching the rolling coulters. These are of decided assistance in steadying the machine, which has a tendency to swing from one row to the other owing to the irregularity of the spacing of the plants.

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* After the photograph was taken it was found that a 6-foot blade, instead of three sections of saws, gave better results. Width of saws should clear frame by 3 inches.

† Dimensions of machine are as follow:—Length, 10 feet; width at widest point, 7 feet; width of back carriage, 3 feet; length of arms, 8 feet 6 inches; framework, 4 inches by 3 inches (hardwood).

The plants, after they are cut, can be rolled into piles by means of the ordinary spike-tooth or lever-tooth harrow. The method used on the Research Station is to join three sections of harrows together and drag them crossways of the rows. The plants gradually pack under the harrows until the compact mass partially sweeps up the field. (Some difficulty may be experienced by the bolls sliding under the mass where grassy conditions have been allowed to develop.) Eventually sufficient plants accumulate to force the harrow up and over the roll of them, thus obtaining an automatic self-dumping effect. The plants can be quickly cleaned up in this manner into large wind-rows, and as soon as sufficiently dry will readily burn. It is suggested in this respect that the grower experiment to ascertain when to rake the plants up. They should not be allowed to dry out too thoroughly, because the bolls will open and the seed cotton will drop out and be left on the ground. It can thus be seen that the removing of the plants offers no difficulties, and every grower is advised to equip himself with a machine suitable for his requirements in order that the old crop can be quickly removed.

The early destruction of the old plants is highly desirable. Each season illustrations are met with where the growers delay the destruction of the old plants in the hope of obtaining the top crop of bolls which nearly always remain after the main pickings have been completed. Numerous examinations of such crops have shown that usually only a small percentage of the upper bolls of three-quarter size or larger contain cotton of much value. Generally, the fibres are short and weak and often are badly stained. Usually such crops are held over where no frosts have been experienced, and the grower hopes to obtain a light picking to make up for a low yield. It is difficult to advise just what indicators to use to ascertain if it is worth waiting for such bolls. In the inland valleys it is believed that usually the grower would be wise if he calls a poor crop a "poor one" and wasted no time in preparing for his next season's crop if he intends to plant again on the same land.

The experiences of the majority of the growers in every district and the experiments at the Research Station all indicate the advisability of early planting.

In this connection it may be of interest to present the results of the time of planting experiments which have been conducted at the Callide Cotton Research Station. These are as follows:—

YIELDS IN TIME OF PLANTING EXPERIMENT.

*Season* 1924-25.

| | |
|---|---|
| 7th October planting | 912 lb. per acre |
| 10th November planting | 855 lb. per acre |
| 19th December planting | 220 lb. per acre |
| 15th January planting—Not picked; failed to mature. | |

*Season* 1925-26.

| | |
|---|---|
| No October planting.* | |
| 5th November planting | 933 lb. per acre |
| 15th December planting | 116 lb. per acre |

*Season* 1926-27.

| | |
|---|---|
| 2nd October planting | 1,071.5 lb. per acre |
| 22nd December planting—No yield; failed to mature. | |

*Season* 1927-28.

| | |
|---|---|
| 12th September planting | 1,734 lb. per acre |
| 5th October planting | 1,180 lb. per acre |
| 30th November planting | 207 lb. per acre |
| 21st December planting | 157 lb. per acre |

* No October planting was obtained in the experiment. Plantings in mid-September on another part of the station produced from 922 to 1,473 lb. per acre.

Usually in most districts the first rains in the springtime do not occur until it is warm enough to plant, and if a well-prepared seed-bed has been established a good strike of a permanent nature is generally obtained. It is where the seed-bed is faultily prepared that difficulties are experienced in either obtaining a good strike or maintaining it during the hot, dry periods which are often encountered in October and November. The contributing factor in such cases is generally the delay in starting the ploughing operations. Usually during the first part of June rains occur, and if the preparation of the new seed-bed starts in time to obtain the full benefits of this moisture, a good seed-bed can be obtained. The ploughing is often delayed because of the length of time elapsing in the operations connected with removing the old crop. It is believed, therefore, if each grower equips himself with the most suitable of these cheaply constructed slide cutters, shown in the included illustrations, this delay can often be avoided and a much better chance of securing a good permanent stand will be obtained.

## STERILISING DAIRY UTENSILS.

### Hot Water.

The practice of scalding utensils with boiling water is still the commonest method of sterilisation. Successful results depend on (1) the temperature of the water and (2) the quantity of water used. Hot water poured around the sides of a can rapidly cools to a point where it is no longer effective in destroying bacteria; the smaller the quantity used, the more rapid the cooling. Experiments have shown that, for an 8-gallon can, *a quart or more of boiling water is required to sterilise it effectively.* It is therefore essential that provision be made for an abundant supply of boiling water; a teakettleful from the kitchen cannot be expected to do the work of sterilising cans, buckets, strainers, separator bowl and discs, &c. A wash boiler or tank set upon a coal, oil, or laundry stove in the milkhouse is a great help in providing hot water for washing, and boiling water for scalding the utensils.

The scalding of buckets, strainers, &c., is very simple, and, if enough boiling water is used and all the inner surface is treated, it destroys and removes large numbers of bacteria. With cans, however, in addition to pouring the boiling water around the sides, it is well to replace the lid, and then roll the can along the floor on its side for three or four complete revolutions to make sure that every inch of the inner surface is treated. Before emptying out the water, the lid may be treated by inverting the can for a few seconds.

Another method of hot-water treatment is useful where the number of utensils to be treated is large. In this method the utensils are immersed for a minute or two in a tank filled with boiling water. The results obtained are superior to those where the utensils are merely rinsed, due to the higher temperature reached, the longer period of contact, and the more complete treatment of the entire surface.

With either method rapid drying-out of the remaining moisture takes place when the utensils are immediately placed on a draining-rack. For the sterilising of dairy utensils, steam has been found to be a suitable, economical, and effective agent.

### Chlorine Compounds.

Few farms are adequately equipped for properly sterilising utensils by either the steam or the hot-water method. As an alternative, a method has been devised by which the germ-killing properties of chemicals of the chlorine group have been utilised. In this method the chemical is dissolved in cold water (thus saving fuel and time) and the utensils are treated with this solution. Because of the greater convenience of this method, it is being widely used, both in the milk plant and factory and on the farm, and, where applied intelligently, is giving results which, in many cases, surpass those obtained by the hot-water rinse method.

Intelligent application of chemical sterilisation requires recognition that its efficiency depends upon—

1. The use of a solution of sufficient strength.
2. A sufficiently long period of contact between the solution and the entire inner surface of the utensils.
3. The absence of milk residue, dirt, or other organic matter which destroys the sterilising power of the solution.

There is nothing complicated about the method, but it is not foolproof, and, unless the above simple conditions are fully met, the results may be disappointing.

The germ-killing power of chlorine disinfectants is proportional to the free or available chlorine which they contain. This free chlorine is constantly being liberated and lost, resulting in a more or less rapid decrease in strength, particularly in dilute solutions as prepared for use. Consequently, it is better to make up only enough rinse solution for use at one time, utilising the discarded solution for deodorising floors, drains, &c., in the milkhouse or stable. Either a commercial product may be purchased or a home-made hypochlorite stock solution prepared from which the rinse is made up. The commercial products are usually more reliable as to strength and are very convenient, but are rather more expensive than the home-made solution. With the latter care must be taken to obtain a fresh, non-caked supply of chloride of lime, since this material tends to lose its strength during storage, old stock being often so weak as to be almost worthless for sterilising purposes.

The period of contact with the sterilising solution is obviously important. As with hot water or steam, the longer the exposure to the sterilising agent, the more

complete the action. With chemical sterilisation this must not be less than ten seconds for every portion of the utensil which comes in contact with the milk.

It should not be necessary to dwell upon the third factor—the absence of dirt, milk, &c., from the utensils. Unless these are first of all properly cleaned, no method of sterilising treatment can be expected to give satisfactory results, and least of all the chemical method. *Thorough cleaning is a fundamental necessity.*

## Home-made Hypochlorite Solution.

For the benefit of those who wish to make up their own hypochlorite solution, the following directions are included.

Obtain a 12-oz. can of the very best grade of chlorine of lime, fresh, non-caked, and preferably marked with the available chlorine content. Carefully mix the contents of this can into a paste with a little water, gradually adding water enough to make it up to 1 gallon. To this, add 2½ lb. of sal soda. The mixture should be kept in a glass or earthenware vessel, and not in a metal container, because of its corrosive action. Allow it to stand for twenty-four hours to settle, then siphon off the clear liquid from the top. This constitutes the *stock solution*, and is just as effective as the commercial hypochlorite or chloramine compounds. It should be kept in a dark-coloured bottle or jug, tightly stoppered, and in a cool, dark place.

In preparing a solution for rinsing utensils, add four tablespoonfuls of this stock solution to 2 gallons of clean cold water in a bucket. This rinse may then be poured from bucket to bucket, allowing it to remain for ten to fifteen seconds in each. Then it may be poured into a can, the lid replaced, and the can rolled along the floor for half a minute. With properly cleaned utensils, 2 gallons of rinse is sufficient to treat a dozen 8-gallon cans or their equivalent before weakening too much to be effective. Make up a fresh rinse at each milking. Where a commercial product is used, the manufacturers' directions for making up the rinse should be followed.

Where a large number of utensils is to be treated, this may be done more conveniently by immersing each one for ten seconds in a tank or wash vat full of the solution. The solution should be emptied out after use, and a fresh quantity made up for the next time.

## Drying Utensils.

With any form of sterilising treatment (except pressure steam for twenty minutes), a few highly resistant organisms survive. At ordinary temperature these will multiply at an astonishing rate in the traces of moisture remaining inside the can, and may thus undo all that was accomplished by the treatment. In fact, experiments have shown that cans which were washed, but not scalded, and placed on an outdoor draining rack contaminated the milk less than cans which were washed, thoroughly scalded, drained, and then stood indoors with the lids on. The unscalded cans at first contained many more bacteria, but the rapid drying of the cans prevented these from multiplying, so that at the end of five hours the descendants of the few bacteria surviving in the scalded, but not dried, cans outnumbered them. Had the cans been held for a longer period, the advantage would have been much more strongly in favour of the dried cans.

The importance of dry cans is fully realised in every up-to-date dairy. In all cases where cans show moisture inside, it is essential that they receive one of the sterilising treatments outlined, and, unless they are to be used at once, they should immediately be allowed to dry by placing them on an open-air draining rack exposing the utensils to the action of both sun and wind. The utensils are inverted and placed on such a rack immediately following the sterilising treatment, the traces of moisture soon disappear, and bacterial growth is checked. On no account should a cloth be used for drying the utensils, for such a practice is bound to add thousands of bacteria to the can surface. The draining rack is simpler, takes less time, and gives far more satisfactory results.

A few people object to the practice of exposing utensils on an outdoor rack on the score that dust may blow into them and thus contaminate the milk. While dust, with the bacteria carried by it has no place in milk, yet it would be less harmful than the enormous numbers of bacteria which develop in a moist can. If, however, there is serious trouble due to dust entering the utensils, this may be overcome by rinsing them with either boiling water or chlorine rinse *immediately before use*. The latter is particularly convenient, as it can be made up in a moment. Care should be taken to drain the utensils well, to avoid any chlorine taint and smell appearing in the milk.

# DEVELOPING THE DAIRYING INDUSTRY.

Intensive rotational grazing, conservation of fodder, improvements in type of cattle, and reduction of disease were among the avenues of progress suggested by Professor A. E. Richardson (chairman) when the dairying investigation committee appointed by the Federal Government met in Melbourne recently. The effect of the present systems of land tenure, he said, should be investigated to determine how far they prevented dairy farmers from following progressive policies. The terms of reference to the investigating committee are—

To formulate plans for improving efficiency, increasing productivity, and diminishing costs.

To devise means for enlarging the scope of the £34,000,000 agreement for the purposes outlined by the British Economic Mission.

To determine the prospects of extending the industry in suitable areas in Australia.

Professor Richardson (South Australia) explained that the main task of the committee was to conduct a survey of the dairy industry in Australia, and in the light of evidence available to formulate plans for its improvement. The committee would be relieved of the details by the staff of the Development and Migration Commission. Its methods of working therefore would be to review the evidence collected by the officers.

## An Australian Staple Industry.

The dairying industry was one of the three staple industries of the Commonwealth. It involved an annual production of approximately £30,000,000 a year. The present position of the primary producers had been affected by the fall in the price of exported produce and the severe competition owing to expansion of production in other countries. If the industry was to expand, it would do so only by obtaining a higher value for dairy products, which, in itself, would stimulate increased production; and by cheaper costs, which would enable Australia to compete on more favourable terms with producers abroad.

The British market fixed the world's value for butter and cheese and leading items of export. The recent expansion in dairying in other countries, notably Denmark, the Baltic States, Siberia, and the Argentine, had forced Australia to meet with increased competition and lower prices in the London market. There was little hope at present of inducing Britain to change her trade policy, though increasing support was developing for preferential duties on Empire-grown products.

## The Overseas Market.

At the moment there was no other market available that was capable of absorbing Australia's production for export, and there was no immediate possibility of obtaining higher values than could be given by the London market.

There was little question that greatly increased production per cow and per farm could be effected if only the many would do what the few were doing—exploit the possibilities of their pastures, adopt rational feeding of cattle, and conservation of surplus fodder, systematically improve the producing power of herds by the use of better bulls, by systematic herd testing, and by better methods of farm management. In no other country in the world were cows so dependable on the quantity and quality of the grass as in Australia.

A calculation that he had made on the basis of the stock slaughtered and stock products exported from Victoria showed that, during the last sixty years from Victoria alone, the equivalent of 2,000,000 tons of superphosphates had been removed from pastoral lands through the grazing of stock and the export of stock products. Probably not more than 10 per cent. of this amount had ever been returned to the lands.

## Improved Pastures mean Greater Stock-carrying Capacity.

Judging from results obtained in widely scattered areas in Victoria, there was no reasonable doubt that the stock-carrying capacity of the land could be greatly increased at a cost that would give a handsome return on the expenditure. It was reasonably clear that a very material increase in quantity of pastures and in nutritive value might be expected when fertilisers were more generally used. This would be reflected in increased stock-carrying capacity of milk and butter-fat per cow. More cows might be kept better fed on a smaller area.

He emphasised the value of pasture top dressing and the growth of better types of pastures as fundamental. Another phase was intensive grazing. Young grass was richer in minerals and protein than mature grass. In fact, young dried grass approximated the feeding value of the best concentrates. To obtain the highest production of nutriment from grass, the pastures must be kept short by intensive rotational grazing in relatively small paddocks, instead of allowing stock to wander at large. Whether such intensive methods of grazing were adopted to the best dairying areas in Australia would have to be determined.

### Herd Improvement—Fodder Conservation.

He dwelt on the need for the conservation of fodder and improvements in the type of dairy cattle. Two avenues were available—the use of high-grade bulls and the extension of herd testing. Both the Federal and State Governments were financially interested in the improvement of cattle through herd testing. Another important factor was the reduction of disease in dairy herds.

One other matter was that of land tenure. The effect of present systems should be investigated to determine how far they prevented dairy farmers from following progressive policies. In factories there seemed to be two possibilities—to reduce overhead expenses by regrouping and amalgamation, and to improve the quality of the product by improved supervision and the extension of technical knowledge among factory operators.

At present the world's parity for dairy products was too low to enable many of the dairy farmers to finance such reforms without external assistance.

A general discussion followed on preliminary subjects before the committee adjourned.

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## BUTTER-FAT VARIATION—COWS WITH TIGHT UDDERS.

Why does butter-fat vary in proportion so widely in the same cows? The question has interested many scientific research workers, as well as practical dairy farmers. Among the latest attempts to find some relation between fat content and ordinary working conditions is that of Mr. S. Bartlett, of the National Institute for Research in Dairying, Reading, England, who has made an analysis of the yields of the dairy herd owned by the institute. That herd, comprising Shorthorns and Guernseys, has been individually tested for butter-fat at each milking on three consecutive days in each week since 1922, and has provided 111 complete lactation records for analysis.

The intervals between the milkings throughout the five years have been fifteen and one-quarter hours at night and eight and three-quarter hours in the day, and the conditions, both of feeding and management, were those common to cows in the south of England. Milk secretion is at a slightly lower rate during the longer interval between the milkings; with regard to fat production, in early lactation the weights of fat yielded at the morning and evening milkings were practically the same, but as the lactation progressed the difference between morning and evening yields became more pronounced. From the fourth to the eighth month of lactation, the evening milk contained about 1 per cent. more fat than the morning milk, whereas during the first three months of lactation the morning milk appears to be subject to a still greater depression in butter-fat percentage.

It was found that first calvers in early lactation produce approximately the same, or even a greater weight of fat at the evening milking than they do at the morning milking, and this condition gradually disappears with the advance of lactation. Second calvers produced a little more fat at the morning milking, and in the case of older cows the morning fat yield is proportionately greater; in all-age groups, however, the proportional yield of fat at the morning milking is found to be greater in the later stages of lactation.

Another discovery was that cows with high udder pressure—those with very tight udders—yielded a lower weight of fat at the morning than the evening milking. From this Mr. Bartlett infers that not only does excessive pressure in the udder cause a decrease in secretion, but also induces reabsorption of part of the milk. It is of interest to find apparent reabsorption occurring under ordinary farm conditions.

The small seasonal variations in butter-fat percentage support most of the experimental evidence so far published, showing that foods do not affect the percentage of fat in milk to any appreciable extent, unless those foods upset the health of digestion of the cows. Poor-quality milk during the early spring months may be due to the young grass stimulating milk rather than fat production.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING APRIL, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | April. | No. of Years' Records. | April, 1929. | April, 1928. | | April. | No. of Years' Records. | April, 1929. | April, 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | In. | | In. | In. |
| Atherton ... ... | 4·37 | 27 | 5.52 | 1 26 | Nambour ... ... | 5·36 | 32 | 19·42 | 21·78 |
| Cairns ... ... | 12·09 | 46 | 3·78 | 2·48 | Nanango ... ... | 1·77 | 46 | 2·77 | 6·24 |
| Cardwell ... ... | 9·39 | 56 | 2·37 | 2·31 | Rockhampton ... | 2·23 | 41 | 8·98 | 21·68 |
| Cooktown ... ... | 9·09 | 52 | 6·53 | 1·63 | Woodford ... | 4·10 | 41 | 8·84 | 19·16 |
| Herberton ... ... | 4·10 | 41 | 0 99 | 0·63 | | | | | |
| Ingham ... ... | 8·38 | 36 | 5·10 | 2·93 | | | | | |
| Innisfail ... ... | 21·06 | 47 | 4·32 | 5·90 | *Darling Downs.* | | | | |
| Mossman ... ... | 9·77 | 15 | 4·29 | 2·48 | | | | | |
| Townsville ... .. | 3·62 | 57 | 2·50 | 0·16 | Dalby ... ... | 1·22 | 58 | 2·96 | 5·02 |
| | | | | | Emu Vale ... | 1·14 | 32 | 2·31 | 4·16 |
| | | | | | Jimbour ... ... | 1·21 | 40 | 2·24 | 4·80 |
| *Central Coast.* | | | | | Miles ... ... | 1·28 | 43 | 4·59 | 4·59 |
| | | | | | Stanthorpe ... | 1·61 | 55 | 3 80 | 3·12 |
| Ayr ... ... ... | 2·65 | 41 | 6·23 | 0·19 | Toowoomba ... | 2·37 | 56 | 4·96 | 9·58 |
| Bowen ... ... | 2·78 | 57 | 10 08 | 1·19 | Warwick ... ... | 1·57 | 63 | 3·53 | 4·70 |
| Charters Towers ... | 1·65 | 46 | 2·17 | 0 20 | | | | | |
| Mackay ... ... | 6·48 | 57 | 14·10 | 6·83 | | | | | |
| Proserpine ... ... | 6·02 | 25 | 12·29 | 5·91 | | | | | |
| St. Lawrence ... | 2·71 | 57 | 9·55 | 11·93 | *Maranoa.* | | | | |
| | | | | | Roma ... ... | 1·20 | 54 | 5·84 | 3·93 |
| *South Coast.* | | | | | | | | | |
| Biggenden ... .. | 1·83 | 29 | 9·05 | 5·68 | | | | | |
| Bundaberg ... ... | 2·85 | 45 | 7·25 | 13·54 | *State Farms, &c.* | | | | |
| Brisbane ... ... | 3·77 | 78 | 9 84 | 14 89 | | | | | |
| Caboolture ... ... | 3·90 | 41 | 10·25 | 17·61 | Bungeworgorai ... | 0·72 | 14 | 6·42 | 3·91 |
| Childers ... ... | 2·54 | 33 | 7·65 | 9·76 | Gatton College ... | 1·53 | 29 | 4·37 | 6·94 |
| Crohamhurst ... | 5·78 | 35 | 16·66 | 27·04 | Gindie ... ... | 1·06 | 29 | 2·05 | 6·05 |
| Esk ... ... .. | 2·59 | 41 | 8·27 | 16·69 | Hermitage ... | 1·15 | 22 | 3·44 | 4·00 |
| Gayndah ... ... | 1·33 | 57 | 5·23 | 2·42 | Kairi ... ... | 4·74 | 14 | 0·90 | 1·20 |
| Gympie ... ... | 3·14 | 58 | 9·92 | 14·17 | Sugar Experiment Station, Mackay | 4·93 | 31 | 15·45 | 5·07 |
| Kilkivan ... ... | 2·01 | 49 | 8·41 | 7·13 | | | | | |
| Maryborough ... | 3·44 | 56 | 12·75 | 13·34 | Warren ... ... | 1·31 | 14 | ... | ... |

16th May, 1929.

GEORGE G. BOND,
Divisional Meteorologist.

**Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription—one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.**

*Photo.: Dept. of Public Instruction.]*

PLATE 114.—MOTOR BOAT CONVEYING FARMERS' CHILDREN TO THE MAROOCHY RIVER STATE SCHOOL.

*Photo.: Dept. of Public Instruction.*]

PLATE 115.—NATURE STUDY IS AN IMPORTANT SECTION OF THE YOUNG BUSH QUEENSLANDER'S EDUCATION.

*Top*: A Lesson in forest botany.

*Centre*: When shadows deepen—A young nature lover's camp on quiet waters in the heart of our beautiful bushland.

*Bottom*: Was it a platypus or merely a "yabby"?

*Photo.: Dept. of Public Instruction.]*
PLATE 116.—SCHOOL'S OUT. SCHOLARS OF STONE SCHOOL, NEAR INGHAM, NORTH QUEENSLAND, READY FOR HOME.

# THE CULT OF THE COLT.

By "U9L."*

## EQUINE JIU-JITSU.

### Holds and Grips.

My idea in this article is to give a bit of a dissertation on what, for want of a better name, may be termed equine jiu-jitsu.

A knowledge of this, even in the most elementary sense, is of value in checking fractiousness, and by its employment often much sweat and straining are saved. In spite of a well-known advertisement to the contrary, there's really no need to use force regularly. By utilising natural means as a curb a better effect is achieved, and the horse, be he either an old stager or a colt, recognises that man is a genius against whom 'tis but waste of time to pit his little brains. I've learned none of this out of a book, nor yet have other men taught me one bit of it. It has been garnered by watching horses at play, in love, and during their expressions of hate and fighting, and though I don't claim that the system is even approaching perfection, and there's much to add to it before a man may write himself a master, it's handy to have if for no other means than to amuse yourself.

I've told you previously of the check utilised by gathering the loose skin under the neck and holding that in your clenched fist. Should a horse—particularly a mare—show a reluctance to back you may employ that to achieve your purpose. With that loose skin in your hand, and pressing slightly in the direction in which you wish her to go, you may make the mare go in a reverse lead in any direction you wish.

### Checking a Kicking Horse.

There's nothing checks a kicking horse's ambition like a strap round the ham-string. A saddle strap is just the thing for this, and frail as it is it'll do all wanted of it. With that in position he can't kick. He may swing his leg and make futile efforts to put a bit of ginger into it. But he can't! Failing a saddle strap your own hand may grip that tendon sufficiently to nullify a mighty kick. In fact, if you get the right grip, you may stultify the whole thing by pinching that tendon with your finger and thumb. Dangerous? To a certain extent, sir, but . . .

You'll often see a man trying to check a horse by putting one arm over its neck and the other hand will be employed to pinch the horse's nostrils. He'll maintain that he isn't pinching. But he is—he can't help doing it with the hold he's got. Instead of dropping that other hand on the nostrils, which only makes the horse fight against you to get his breath, if you take him about three inches higher up, and on the bone of the nose, you have the same leverage, the same command, and the horse isn't inconvenienced by having its attention drawn to other matters—the fight against suffocation, for instance.

There's a needle-fine sinew running up the back of the forelegs which, if gripped with finger and thumb, does much to paralyse that foreleg. Failing that elusive tendon, if you take a handful of the muscle in the same place you'll find, nine times out of ten, that horse will drop on that leg; mares, again, are more susceptible to this influence. A similar result is achieved if you bite with your finger and thumb on the front of the bone a few inches above the knee-joint.

The main nerve-centre—or, rather, the plural of that—is just in front of the wither and just behind it. Watch two stallions fighting. Failing that, watch a stallion making advances to a cat-tempered shrew. He knows where to go and what to do to nullify retaliatory measures. If a horse won't stand, and if your hand is strong enough, take a grip of his wither pretty low down and squeeze. It's well to have a bridle on when you do this, and to hold short on the near

*In the "Pastoral Review" for May, 1929, previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, March, April, and May (1929) Journals from the February, April, May, July, September, October, December (1928), January, and February (1929) numbers of the "Pastoral Review."

rein with the left hand while you squeeze with the right. If you're not as strong as you think you are the horse will bound forward. But if you have the strength which should be yours you'll see that horse stand stock still and quiver. It will flinch a bit and stand motionless and without the power to move.

### A Fool Trick.

This is a fool trick, but it at least shows what sort of a nerve centre is in front of the wither. Mount your horse, take a handful of his mane about 9 in. back from his ears, and pull up with that with all your strength. Press the other hand on the back of his neck just in front of the wither and exert yourself in an effort to squeeze down. Now urge the horse forward. In less than a dozen strides that horse will stumble to his knees, and unless you release your grip lively he will roll right over quite helpless.

How many times have you seen a man holding a horse's foot up and have his hand placed under that horse's fetlock? You'll see it nine times out of ten. That suits the horse right down to the ground. He's got a sling in which to rest his weight, and he has the full use and power of that limb. Take him by the point of the toe of the hoof, and double that fetlock joint. In that position, and particularly with that joint bent, the horse is helpless in that leg and he can't put an ounce of weight on you. He can swing it mildly; but he can't make use of it. The same thing applies both fore and aft. If you double that hind fetlock then the leg is yours. Of course, the horse has three other legs which it may utilise; but the one you've got is yours till you let it go. We've all seen a colt thrown and men essaying to put a loin-rope on it. They'll strain and heave to double those hind legs at the hocks, and mighty are the exertions on both parts—the colt's and the men's. And yet did they but catch the hoof in their hand, double the fetlock joint over and hold it in that position, the hind leg could be folded up and crumpled like a sheet of wet tissue paper!

The flank's another nerve centre. With any sex, though particularly with mares, a grip of the flank makes you the master. Take a short hold of the rein before trying this also. When you've got that grip, and when you're standing in close—as you should be doing all the time—take a handful of flank and grip tight. The horse will flinch, it may even try and bound forward—the short grip of the rein and the fact of being in against it protects you—and it will then stand with one limp hind leg. That's the one of which you have the flank. Take a good hold of that muscle and the horse knows you've got him where you want him.

### Another "Button" to Press.

The stifle, which corresponds to a human knee-joint, is another button you press to bring the light of understanding to a mare. Take that in your hand, gripping with your fingers like the teeth of a stallion's mouth, and note her lean over in helplessness towards you. If you've got a short hold of the rein, and if you lift your right foot then and hook the toes of it round her hamstring, and pull with that foot, you'll find the mare will come right over till she overbalances and then she sits down like a begging dog. Her forelegs will be stretched out in front of her, and if you snap with your fingers at the muscles there she'll double that leg to pull it under her. As soon as she does she'll roll over on her side and, if you're smart enough, you whip her tail between her hind legs, up through her flank, and she's yours till you like to let her up again. That takes doing; but it can be done.

### The Tail Hold.

Should you not be as smart as you might be, and if the thing struggles up after you've drawn her tail through her flank, there's no need to despair. She's yours again if you're able and willing. Keep hold of that tail, and as she rises to her feet hang on one side of her with your knees pressed against her ribs. She'll stagger along with a dot-and-carry-one action, and when she notes you there, and makes a guess at what you're trying to do, she'll make an effort to bound. She can't. But she'll try. That is your chance. When the thing's partly in the air, and off her balance, using that tail as a lever, and your knees as a fulcrum, throw yourself backwards. The mare will flop heavily on her side and you'll land on your feet beside her. Then, if you've done it right, you can repeat from where you left off last time.

Another nerve centre is a fine sinew running up the back of a mare's buttocks. It's only a little thing, and you may take it easily between your finger and thumb.

If you locate it, and if you pinch it, the mare will do one of several things according to the state of ticklishness which is hers. If she's not very thin-skinned she may ignore it almost, and if she is susceptible to the influence then she'll run back and sit down as though she's been standing on a pat of melting butter.

If a horse won't stand, and you wish to perform any operation while he's standing on his feet, a hold of his tail is a steadier. Get this—it applies equally to mares—and bend it straight back along his spine. Use force in this and press that tail back till its joints are cracking. That horse will spread its four feet wide, it'll extend its head in its helplessness, and it stands like a graven statue of immobility. Do what you will, that horse can't offer any resistance worthy of the name till you've released that strain. It has no after effects, and it's quite safe to use.

### Throwing a Foal Without Ropes.

Without ropes you throw a foal by catching him first. To do this you throw your right arm over his neck and curb his bounds by pressing with your buttocks against his chest and propping your own legs straight out in front of you. That's easy and you check his ambitions in no time at all. Moving fairly lively and never giving the foal time to get set and read your intentions, you swing round, keeping your right hand on his neck just in front of the wither, and with your left hand you knock his muzzle over your right biceps—there or thereabouts. Now you press down with a steady strain with your right hand and lever the thing's muzzle up with your biceps at the same time. While you're doing this you make a half-turn to the left, swinging the foal with you, and he goes down on his buttocks and rolls on to his side without any trouble at all. We never used a rope on any foals under about ten months. And we dealt with some sturdy jokers, too! The more a foal struggles and attempts to bound in this exercise the easier he is. It's the fellow who won't move, who stands with widespread legs and ignores your efforts, who stays put and defies all attempts to throw him.

Those are just a few holds and grips, being a very brief outline of what can be done with a little judgment and a fair share of activity. I tell you they can be done, but don't forget the first essential in all things—get in and stay in close. If you do that you have a chance of finishing your job in the round yard; if you neglect it you'll finish in the hospital.

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*Photo.: Jean Easton.*]

PLATE 117.

Minto Crag and its Parent Range forms a Protecting Background to Coochin's Rich Agricultural Lands.

# POINTS FOR MOTORISTS.

## DECARBONISING "DIRTY" ENGINES.

"How often do you have to decarbonise?" is the question that invariably crops up when two or three car owners are comparing notes. The fact that this query is so often raised is in itself sufficient to show that the distance that engines can run between carbonisation varies considerably. This, perhaps, is only to be expected where engines of different design and make are considered, but it usually comes as a distinct surprise to an owner to learn that a car which is identical with his own has to be decarbonised at very different intervals. It is a fact that, whilst some owners of a popular make of car decarbonise every 1,500 miles, others are able to cover a mileage of 6,000 without removing the cylinder head. This discrepancy can in some measure be accounted for by the varying mechanical sensitiveness of different drivers, for it is well known that some owners are quite content so long as the car runs passably and does not give any trouble, whilst the least falling-off in power is a matter of grave concern to others.

The formation of carbon in an engine cannot, admittedly, be prevented altogether, but the rate at which it accumulates is certainly not beyond the control of the driver. Analysis of the deposit found on a cylinder head and piston crown has shown that it has two main constituents; the first is the element carbon, produced by lubricating oil that has burnt and by the combustion of petrol; the other is of a mineral nature and is the result of road grit finding its way through the carburetter.

### The Composition of Engine Oil.

Before going into the question of reducing the carbon formed by oil, it will be well to consider briefly the composition of engine oil. There are three main classes—first, those oils that are composed entirely of hydrocarbons (a combination of hydrogen and carbon), and these are by far the most used in ordinary touring engines. Then come pure vegetable oils, which are usually a combination of hydrogen, carbon, and oxygen, whilst in the third class are those oils that are formed by a combination of hydrocarbon (or mineral) and vegetable oils.

No matter what its composition, however, engine oil tends to become thinner or lose body when it becomes hot, and at very high temperatures it will decompose. In the case of vegetable lubricants, the decomposition may first result in the formation of acids, which cause the oil to become rancid, but in the case of a hydrocarbon oil intense heat will result in the oil "cracking"—that is, splitting up into simpler hydrocarbons, such as petrol and kerosene, with the formation of pure carbon. Apart from the loss of its value as a lubricant, an oil that has "cracked" will obviously result in an engine carbonising quickly.

Pure hydrocarbon oils, however, will stand very high temperatures without cracking, although, of course, they will become thinner. "Straight run" oils—that is, those that distil completely over a limited range of temperature—cause less carbon formation than those that are composed of light and heavy fractions mixed to obtain a suitable viscosity. This is because the lighter constituent will volatilise and burn at a lower temperature than the heavier fractions, thus leaving a viscous constituent that cracks under prolonged exposure to heat.

Many good oils contain small proportions of vegetable fats, which improve their lubricating value considerably, provided that these fatty oils are not present in large quantities. They will not affect the rate of carbon formation owing to their high flash-point—the temperature at which they will give off an inflammable vapour and burn—but except for racing, where their property for resisting heat is valuable, oils containing a large proportion of vegetable fats should not be used.

### "Cheap" Oils Dear at Any Price.

From these remarks on the combustion of lubricating oils, it is obvious that great care has to be taken in producing them, and this accounts for the comparatively high prices charged for good-quality engine lubricants. It also emphasises the futility of buying cheap oils in the belief that money is thus saved.

It is always wise to follow the engine manufacturers' recommendations, for by doing so the owner is sure not only of getting an oil of good quality but also one that is suitable for his engine. It is quite obvious that a lubricant that is too thin, for instance, will not be satisfactory, because, to give only one reason, there is far more likelihood of it finding its way past the piston rings into the combustion chamber, where, of course, it will be burnt.

Much can be done to reduce carbon formation by keeping the oil in the sump cool, but this, of course, is more a matter for designers than owners. The base of a sump will sometimes be found to be ribbed, and this is done solely to keep the oil as cool as possible. In racing cars, and one or two high-powered production models of Continental origin, makers have gone so far as to fit a special oil radiator. Although it is, of course, beyond the scope of an owner to go to these, he can at least make sure that his front number plate does not interfere with the draught of air past the sump; if it does, the owner will find it worth while to alter the position of the plate.

Much attention has been directed of late to oil rectifiers; these devices are fitted in the oil-circulating system of an engine and serve to remove any particles of solid carbon contained in the oil and to distil off any petrol that may have become mixed with it. Oil rectifiers, however, serve rather to prolong the life of an engine by ensuring better lubrication and to cut down oil bills owing to a less frequent need for draining the sump than to reduce carbon formation.

## An Important Point.

The great thing to remember is that oil must be kept, so far as possible, out of the combustion chamber, and in this matter much can be done by a private owner. After an engine has been used for a considerable time its oil consumption almost invariably increases, and this is nearly always due to oil finding its way past the piston rings. The call for more frequent decarbonisation follows as a natural result. When an engine is dismantled, therefore, it is false economy not to replace a piston ring that has become worn or has lost its springiness.

Many manufacturers fit a scraper ring, which removes any excess of oil from the cylinder walls and returns it to the crank case. The actual ring itself does not, as a rule, vary from the others, but the lower edge of its groove is bevelled off, and holes are drilled through the piston; thus, as the latter descends, oil is collected by the ring and forced through the holes in the piston back to the crank case.

Where a scraper ring is not fitted and the cylinder walls have worn, rapid carbon formation and high oil consumption can often be checked by bevelling off the lower edge of the bottom-ring groove and drilling holes through the piston, thus causing the ring to act as a scraper.

When reassembling an engine, always be careful that the piston-ring gaps are not in line, for, besides causing poor compression, this will allow oil to creep past. Descending long hills in gear with the throttle closed is another cause of oil being drawn into the combustion chamber, because the vacuum produced by the descending piston tends to suck oil past the rings. Under these conditions an extra air valve is of unquestionable value, for the throttle can be closed and the valve opened, so that air is drawn into the cylinder and a vacuum avoided.

Aluminium pistons, owing to their high coefficient of expansion, naturally have to be allowed a greater clearance in the cylinder than the cast iron type, and it might be thought that this would result in a more frequent need for decarbonising. Admittedly, there is more likelihood of oil finding its way into the combustion chamber, but this disadvantage is offset by the fact that aluminium is a much better conductor of heat than cast iron. The piston, therefore, runs cooler, and there is less likelihood of oil on the piston crown and underneath the head being burnt.

A certain amount of the carbon formed is produced from petrol, and here again an owner can take steps to reduce it. With a perfect mixture of petrol and air the principal products of combustion are carbon dioxide and water, but if the mixture is too rich not enough air will be supplied to oxidise the fuel completely; as a result, soot—or, in other words, carbon—will be produced. For this reason a carburetter should be tuned to give as weak a mixture as possible without loss of power.

## Common Mistakes.

Then, again, excessive use of the air strangler when starting up must be avoided, as this produces a very rich mixture, whilst the carburetter should not be flooded before starting the engine unless absolutely necessary, as this has the same result.

Finally, we come to the question of dust and road grit. This is responsible for a considerable percentage of the carbon deposit in an engine. Some power units are worse offenders than others in this respect, for the air intake to the carburetter is so placed that a large amount of dust is sucked in through the air intake. The position of the intake cannot always be varied readily, but the difficulty can be overcome by fitting an air cleaner to any car on which it is not already a part of the standard equipment. A number of proprietary makes which can be fitted to any engine are now on the market, and their value is unquestionable.

# THE FARM TRACTOR.

## METHODS OF AIR FILTERING.

By E. T. BROWN.*

The importance of supplying the engine with clean air, through the medium of the carburetter, has been mentioned previously. It is so serious a matter, however, when dust and dirt are allowed to find their way into the engine parts, that further reference may be made to it. The greater part of the tractor's work is carried out under very adverse conditions. The soil is dry and the movement of the outfit and the attached implement raises a cloud of dust. Some means of filtering the air must be found.

There are a number of methods employed for cleaning the air. One of these is to wash it by passing it through a body of water. In passing through the water the air drops its load of dust, and, at the same time, carries with it a certain amount of moisture. This method, therefore, is an excellent one for those engines that need a little water for cooling the mixture when running on kerosene oil.

In another type of filter the air is conducted through curved channels, from which it issues to strike a large central cone. The air is given a whirling motion, which tends to cause it to deposit all dust in suspension that is heavier than air on the sides of the cone. The separated dust falls down the sides of the cone into a receptacle placed below.

A third form is that in which the air is forced through a compartment containing oily wool or some similar material that is capable of collecting the dust. Still another type of cleaner consists of a cylinder of wire gauze on which felt is stretched. The air strikes the felt on entering, and the air alone passes through, as the dust is repelled by the closely woven felt.

### Attention to the Air Cleaner.

It is one thing to fit a satisfactory form of air cleaner; it is quite another to attend to it in a proper manner. Under ordinary cultivation conditions the air contains a tremendous amount of dust. If the cleaner be effective, the accumulation of dust during a few hours' work is enormous. Unless the device be cleared out as occasion demands it cannot fulfil its intended function. A clogged filter means that air will be unable to enter the carburetter, and the engine will be so starved that it will either stop altogether or run very feebly and develop little power.

It is important to see that there is no leak in the connection between the cleaner and the carburetter or between the separate parts of the cleaner itself.

Filters, whether of felt or other material, will not be effective if there be any holes in the filtering agent. The dust will easily find an entry through any holes there may be, even if these are only minute. Some cleaners incorporate a number of moving parts. These develop trouble in time, because the parts wear owing to an accumulation of oil and dust. The float in the water-type cleaner may have holes worn in it, in which case a new float must be fitted. Centrifugal types may become so encrusted with oil and dust that their action may cease entirely. Cleaners with small passages may clog up solid, and other kinds may so increase their vacuum effect, due to the accumulation of dust, that the power of the engine is reduced greatly. Whatever system be employed, the maker's instructions should be followed to the letter.

* In the "Farmer and Settler."

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# SELECTING THE BREEDING SOW.

## POINTS TO BE OBSERVED.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

*There is no more important job associated with the introduction of pig raising on the farm than that of knowing what to do, where to purchase, what price to pay, and how to select the breeding stock. The points to be observed in the selection of the sow (as is also the case in selecting the boar) are the same, whether one sow or 100 sows are being selected; hence a general outline of the method of procedure and of the various points to be looked for will be of value. Mr. Shelton's notes on these matters are the outcome of a lifetime's experience, and should be of particular interest to all those associated with the pig industry.*—ED.

In selecting the breeding sow, the essential points to be looked for are:—

(1) Knowledge of ancestry and pedigree.
(2) Healthy and vigorous constitution.
(3) Maternal instinct.
(4) Body development.
(5) Indications of milk production.
(6) Evenness of type and conformation.
(7) Breeding value.

### HEREDITARY FACTOR.

It is necessary first of all to remember that no matter how good the boar may be or how efficient the system of management, unless the breeding sow is capable of producing, suckling, and rearing satisfactory litters, the business of pig raising will be a failure. The writer has heard breeders say of their sows that money could not buy them; thus indicating the paramount value they place on these animals. Therefore, the first thing is to ascertain whether the sow it is proposed to purchase comes from parents of a prolific, easy feeding, quick maturing strain. As with the boar, it is not possible to determine these qualities by appearance alone. The only reliable guide to inherited qualities is the pedigree with stud records, litter records, and fecundity records (if they are available), together with the assurance of the breeder and of his records.

#### Breed Records.

In Australia, the interests of breeders of stud pigs are cared for by the Australian Stud Pig Breeders' Society, an organisation having a Federal Council with branch committees in each of the States. In Queensland the office of the society is at 3 Inns of Court, Adelaide street, Brisbane, the secretary being Miss Joan Mackay, from whom all particulars regarding the breeding of any particular animal registered or eligible for registration in the Australian Stud Pig Book may be obtained.

#### Registration of Records.

This society keeps stud records of all registered animals and of the litters of registered sows, and arranges for official transfers when stock pass from the care of one breeder to another. In this way it is possible for purchasers of purebred pigs to ascertain with a maximum of certainty the breeding records of any particular animal they desire to purchase or inquire about.

#### Hereditary Influence.

Pedigree and breeding records are of the utmost value and should on no account be overlooked. It is wise to remember, too, that though individual excellence of the animal itself is highly desirable, it really occupies second place in comparison with the quality and production records of the parent stock. Pedigree is simply the permanent record of the breeding of an animal, and is of little value in the

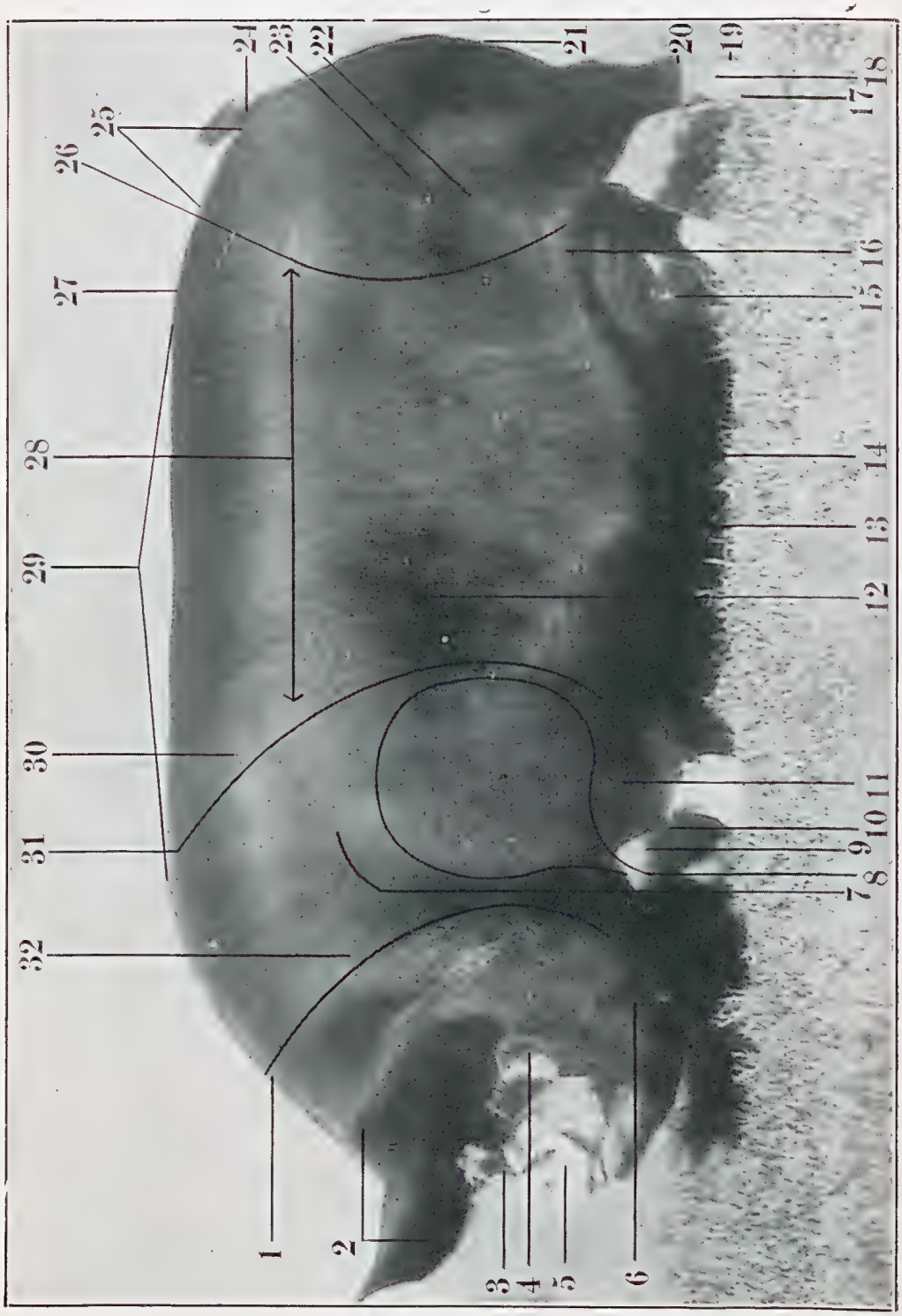


PLATE 118 (Fig. 1).—THE POINTS OF A PIG.

## DESCRIPTION OF PLATE 118.

*Principal Points of the Pig.*

1. Head.
2. Ears.
3. Eyes.
4. Face.
5. Nose or Snout.
6. Cheek or Jowl.
7. Shoulder.
8. Shield on Shoulder especially in Males.
9. Chest.
10. Knee.
11. Forearm.
12. Side and Ribs.
13. Belly.
14. Site of Sheath in Males.
15. Teats.
16. Flank.
17. Foot and Hoof.
18. Pastern.
19. Dewclaws.
20. Fetlock with Hock Joint close to the figure 21.
21. Site of Testicles in Males—At top of line above figure 21.
22. Stifle.
23. Ham.
24. Tail.
25. Rump.
26. Hindquarter.
27. Loin.
28. Middle Piece.
29. Back.
30. Top of Shoulder.
31. Forequarter.
32. Neck.

absence of records indicating the capacity of the strain to breed true to type, and of the ability of individual representatives to prove profitable by producing stock of equal or superior merit to those produced by the parents.

### Other Features.

Even with crossbred or non-pedigree stock it is necessary to study the records indicating such important features as prolificacy, prepotency, early maturity, &c., otherwise one may select as breeding stock the progeny of animals that have produced small and unprofitable litters, even though the individual members of the litters may have been true to type. The capacity to breed freely, regularly, and satisfactorily is certainly hereditary and is transmitted in no uncertain way. A breeding sow selected from a litter of three pigs cannot be relied upon to produce large and satisfactory litters, even though individual animals in such litters may occasionally prove productive.

### Constitution.

The innate bodily strength of an animal and the ability to withstand adverse conditions together with the capacity to resist disease is referred to as constitution, and as such represents an extremely important point in brood sow selection. The vigour and health of the animal is dependent upon its constitution, though it is possible to ruin a good constitution by mismanagement and neglect. In the pig a strong vigorous constitution is indicated by a full, broad, deep, capacious chest and roomy heart girth; good width between the eyes, ears, and forelegs; clear bright eyes, and moist snout; soft, silky, mellow skin and hair, and attractive healthy action.

### Vigour.

Pigs need to be strong and healthy if they are to prove profitable, and it is important that all the features referred to be sought for in the selection of such animals.

## MATERNAL INSTINCT.

To be distinctly effeminate and of a gentle, matronly disposition, withal to be well developed, of good size, and of an attractive type is highly desirable in a breeding sow. Coarse masculine types that run to fat and that lack maternal instinct are quite useless. By maternal instinct is indicated the capacity of the sow to desire to become the mother of numerous progeny and having produced such families to be able to care for and suckle them in true motherly fashion.

## BODY DEVELOPMENT.

In the course of one's travels one frequently comes across big, burly, "beefy" sows that look as if they would turn up their noses at the job of suckling litters, these sows being often of a savage, cranky disposition, preferring all the time to fill their stomachs with whatever food there is available, and then to go and sleep off the effects and live a life of ease. This type of sow is a bug-bear to the industry, as also are those small, chubby, pot-bellied types one frequently notices on farms where wild pigs have been kept, and where it is the practice to mate the the sows just as soon as they are big enough and are ready to take service.

### Size and Conformation.

Breeding sows should be large, roomy, and well proportioned, with wide capacious chest and long deep bodies and hindquarters, otherwise they are unable to allow for the development of large thrifty litters and for their free and easy birth at farrowing time. The capacity to produce and rear numerous progeny must be encouraged by proper development during the early stages of the animal's life, and by its selection from strains noted for these desirable and necessary qualities. This requires that during the growing stages the animal should be encouraged to grow and stretch out in preference to being fattened, and this can only be done by permitting free range over succulent pastures where the animal will have opportunity of picking up not only green food and mineral element, but will have the benefit of sunshine, exercise, and a clean healthy environment. One pities the sows that are kept continuously penned up in small ill-ventilated and insanitary pens and yards. The stock themselves appreciate the provision of roomy paddocks and succulent pastures, and grow and develop to considerably more advantage than is possible under conditions unfavourable to quick growth and maximum bodily development.

## INDICATION OF MILK PRODUCTION.

Another feature that should be carefully sought for is the one indicating the ability of the sow to produce a large and continuous flow of milk. Many breeders overlook this most important point and select their stock without any reference at all to the capacity of the dam to milk heavily. In recent years considerable attention has been given to the milk production records of milch cows, and the farmer is now very out of date who does not make careful inquiry into the milk yield of the families from which his dairy cattle are selected. It is a fact that some strains of pigs and some animals are very poor milkers and do not produce sufficient milk to satisfactorily nourish their litters. Other strains are noted for their ability to milk heavily and to suckle freely. It is possible, if records were kept, it would be found that some breeds are heavier milkers than others, and in this connection it is the writer's observation that the Yorkshires and Large Blacks are

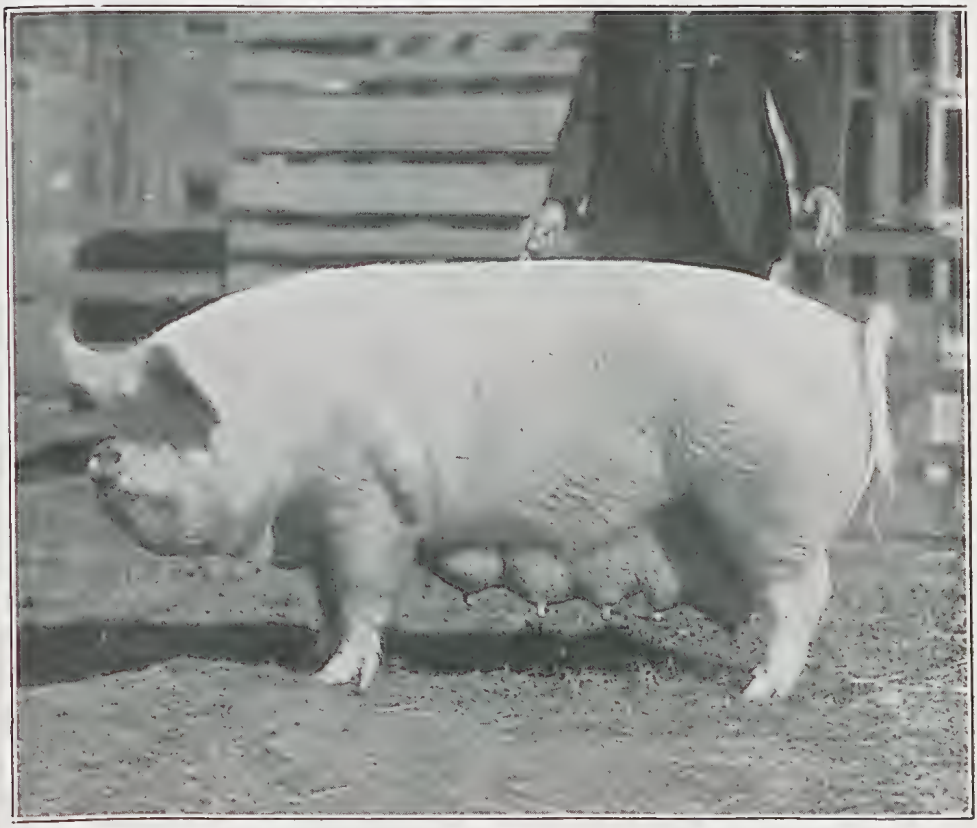

Plate 119 (Fig. 2).—Typical Breeding Sow of the Middle Yorkshire Breed.

A sow capable of rearing large, thrifty, early-maturing pigs. Note the remarkable development of udder and teats, indicating the capacity to produce large quantities of rich milk.

She was about two years old when photographed, and won the Reserve Championship at the Melbourne Show.

heavier yielders than other breeds common in Australia, though it is acknowledged that there are many very superior quality females in breeds other than these two of British origin. It is possible, too, that even in these two breeds there may be found "duffers," poor mothers unable to satisfactorily rear litters, but this is certainly the exception and not the general rule. A sow should have at least twelve and preferably fourteen sound, prominent teats evenly placed equidistant along both sides of the belly. Blind, small, or improperly placed teats set too close together are an objection, even though at times small and apparently improperly developed teats may develop to advantage during the suckling period. At any rate, it is

certainly important that consideration should be given to the selection of breeding stock from strains noted for production, and where animals are found to be unproductive they should be immediately culled and disposed of for slaughter to the butcher or bacon curer.

In just the same manner breeding sows that prove their capacity to produce freely, regularly, and abundantly, and that are noted as heavy and continuous milkers should be retained, and stock selected from their litters should be used, even in preference to fresh and unrelated strains about which, possibly, one has but little knowledge.

### Keep the Best.

The policy of taking all you can out of an animal and giving back little in return and discarding such an animal after a year or two is not a good business proposition; it is far better to retain strains that have proved themselves and

PLATE 120 (Fig. 3).—THE EX-CHAMPION OF CHAMPIONS.

A unique photograph of that famous sow, "Brentwood Dorothy," now deceased. She realised at public auction at the Sydney Show Stud Pig Sales, six years ago, 130 guineas. This sow was a profit-maker of the highest order, and was just as good as she looks. The purchasers, McPhee Brothers, of the Richmond River District (to the right of the picture), are shown in company with Mr. H. J. J. Honey, another enthusiast in pig breeding and in stud stock.

endeavour to develop these still further. It is also much more profitable, especially seeing there is sometimes some difficulty in securing what one may term really high-class productive and reliable strains.

## OTHER POINTS.

Easy feeding, contented, docile strains may be depended upon to transmit these qualities to their progeny, hence in studying economy of production it is wise to remember the more pounds in weight animals can put on in a given time on a given amount of food the greater the margin of profit and the lower the cost. Successful pig raising depends upon the production of more pounds of pork and bacon from the food consumed.

**Points to Look For.**

The breeding sow should be fairly low set, of good length, good constitution, deep-bodied, strong in the back, broad and deep in the ham, and be symmetrical throughout. She should stand squarely on her feet and legs; her head should be refined, indicating quality and representing the feminine type. A good breeding sow invariably has a neat feminine head.

The neck should be short, fitting smoothly into the shoulders, which should be broad, deep and smooth on top, well fleshed, but free from any sign of coarseness. The back should be long and straight, with no sign of weakness or falling away (sows that have a weak or hollow back rarely produce good pigs); it is an advantage to have the back slightly arched. The evenness of width of the back is also important, as this influences the width of the loin connecting the back to the hams in a strong arched fashion.

The sides should be long, deep, and smooth, and free from wrinkles; the top line and underline straight and even. The rump should be broad and well topped up; the tail set high and on a level with the back; the tail should be curled, as this is an indication of health and vigour. The rump should not fall away or droop. The hams should be wide, deep, and well fleshed down to the hock; the legs straight and strong, with good, strong bone. One very common fault is weakness of the knees and pasterns. The leg bones should be fine and close in texture, not round or porous; the feet comparatively small and not splayed; the flanks should be thick and carry a good proportion of flesh, as the belly of a side of bacon is considerably increased in value if the flesh is thick and firm.

**The Teeth, Tongue, and Eyes.**

In general, the breeding sow does not develop tusks to the same extent as the boar, though some sows have quite prominent teeth. Attention should be paid in the selection of breeding stock to note that their teeth are in order, though it is a difficult job at any time examining a pig's teeth. Occasionally one notices breeding sows (in particular) with long overshot top or lower jaws, and with the tongue permanently protruding either from the front or side of the mouth.

The writer considers these faults as very serious ones which are decided by hereditary tendencies, and faults that should on no account be overlooked either on the farm or in the show ring. Undershot crooked jaws, bad teeth, a crooked snout, or a snout with a decided hump are all to be avoided.

Similarly, roached or hollow-backed animals with "cow licks" or tufts of hair turned up or awry on the shoulder back or rump are to be avoided. It is wise also to pay special attention to an inspection of the eyes, for, strange as it may seem, some sows, particularly of the short, fat breeds are quite unable to see. In some cases, individual animals will be noted with no eyes visible at all. On more than one occasion the writer has culled breeding sows on account of blindness, and has been offered stock so affected.

Occasionally this defect develops with age. The matter is sufficiently important to warrant attention. On one occasion the writer was offered (by a very prominent breeder) a really choice sow suitable for show purposes, that on inspection turned out to be a barrow. The vendor (manager of a large piggery) admitted he had always inspected by standing in the passage outside the pen while the pigs were being fed and admiring their broad, even, well-developed backs.

Sows might, of course, be non-breeders without exhibiting any external indication of this very serious defect, though to the experienced eye there is something in the appearance of an animal that acts as a fairly reliable guide, but not an infallible one in cases of this description.

Strength of legs is desirable in the sow as in the boar. It is equally essential to avoid selecting sows showing any indication of umbilical or other forms of hernia (rupture). Some Poland-China sows (in particular) show remarkably heavy development of loose skin in the "twist"—that portion of the hindquarter between and at the back of the legs. In some instances there is an appearance as of a scrotal sac, though this is not usually an indication of hernia or malformation.

**Even Temperament.**

Never select a nervous, fidgety animal for she will make a poor mother and generally a poor suckler. In order to save more pigs at farrowing time, the sow must have an even temperament. She should be easy to handle and not become irritable when the attendant enters the pen.

PLATE 121 (Fig. 4).—TYPICAL PRIZE-WINNING TAMWORTH SOW "MANNING ELNORA" (243).

This sow appeals as one of the most typical and up-to-date Tamworths exhibited at Australian Shows. She was a prize-winner at Brisbane Royal National Show. Note her compactness, width, and depth of ham and side and the fine quality hair and skin. An ideal type of breeding sow. She reared many successful litters and is of a type much sought after. She was valued at more than thirty guineas at an early age and produced several hundreds of pounds' worth of [illegible]

Savage, vicious sows (sometimes erroneously referred to as "man eaters") are to be strictly avoided. Care should be taken to avoid classing a sow as a "man eater" if she is suddenly disturbed while sleeping with or suckling a new born litter, especially if disturbed by a stranger whose attention she is unaccustomed to. It is but natural for a sow to protect and care for her progeny (the boar usually sees to this too if he is about) especially while they are very young and unable to care for themselves to the extent that is possible as they grow older.

A good breeding sow is as careful with her babies as is a good matronly hen mothering fifteen to sixteen chicks. Many sows are of a coarse "don't want to breed" type that simply flop down on top of their young ones and smother them one by one till all but one or two of the strongest and most cunning ones remain. Other and better sows take the greatest care possible in rising or lying down in order to give their young ones a chance to escape being crushed. These matronly qualities are certainly inherited and transmittable.

Similarly, good breeding sows of the domesticated race of pigs appear to have enough common sense to know that their owners are watchful and careful and are not out to rob them of their suckers.

## Value of Breeding Sows.

It would be well for the beginner, especially if he or she does not know the value of breeding stock, to get in touch with some reliable, and, as it were, disinterested person with a view to enlisting their assistance in these all-important matters. It is first of all necessary to value the animals to be selected in association with the environment under which they have been developed. The very fact that a stud sow or boar (none other than selected animals would be offered unless by special arrangement) was being selected from a stud like, say, Gatton, Hawkesbury, Dookie, or Roseworthy Colleges, or from the studs of other breeders equally as well and favourably known, immediately indicates that it has a value a good deal above that of ordinary "meat" market stock. The reputation of the stud in this case is a guarantee of value, though, of course, unfortunately, no breeder can absolutely guarantee that any one or other of the animals offered or sold will turn out to the seller's or to the buyer's expectation. The health and well-being of an animal is dependent to a very considerable extent upon the health and well-being of other animals in the same stud, and in this way also added value is given to animals selected from reliable healthy studs.

## Condition.

The breeding, pedigree records, &c., all add value, for it is but right that a specially selected, registered (or eligible for registration) animal should carry a higher value than common unregistered stock. Again stock that have been properly prepared for sale, have been well advertised, and are in the pink of condition at time of inspection, will command higher values than stock not properly prepared or from studs that do not bother about these things. A good wash and clean-up and bright glossy skin and hair are recognised the world over as additions to the toilet that add considerable value, and that in their own particular way are extremely important items, though one does not want to pay an excessive price for soap, water, and oil, unless the quality and guarantee of breeding are there.

Value is added to any article in accordance with the way in which it is placed before the prospective buyer, and this refers to stock in just the same way as it refers to any other line of merchandise. There are, of course, the "go-getters" in the stock world, just as there are in the commercial world, but, at any rate, value is added to the animal that is correctly described and is placed before the prospective buyer to the best advantage possible. The pen, sty, yard, paddock or other enclosure in which an animal is confined whilst awaiting inspection, adds its quota of value or detracts from same. If the prospective buyer has to wade through mud and slush inches deep, and has to run the risk of being splattered with mud whilst inspecting the stock, his idea of their value will be on an entirely different plane to that which would be effective if the animal were offered in a clean, cosy, comfortable pen in an environment that indicated that the comfort of the buyer was pre-eminent in the mind of the seller. The purchase of breeding stock that have been awarded prominent and valuable prizes at agricultural shows, and that come from prize-winning strains, well-known, adds a value which is difficult to estimate in pounds, shillings, and pence.

SPECIAL NOTES RE ILLUSTRATIONS.

Figs. 5, 6, 7, 8, emphasise the importance of studying the condition of the breeding sow, for on this depends much of the success in the handling of both sow and her progeny. Many farmers do not allow their sows to develop sufficiently or grow large enough before mating, nor do they allow the sow sufficient nutritious food during her breeding period. Some sows are kept in a very fat and unprofitable condition. The ideal breeding condition is shown in Fig. 4.

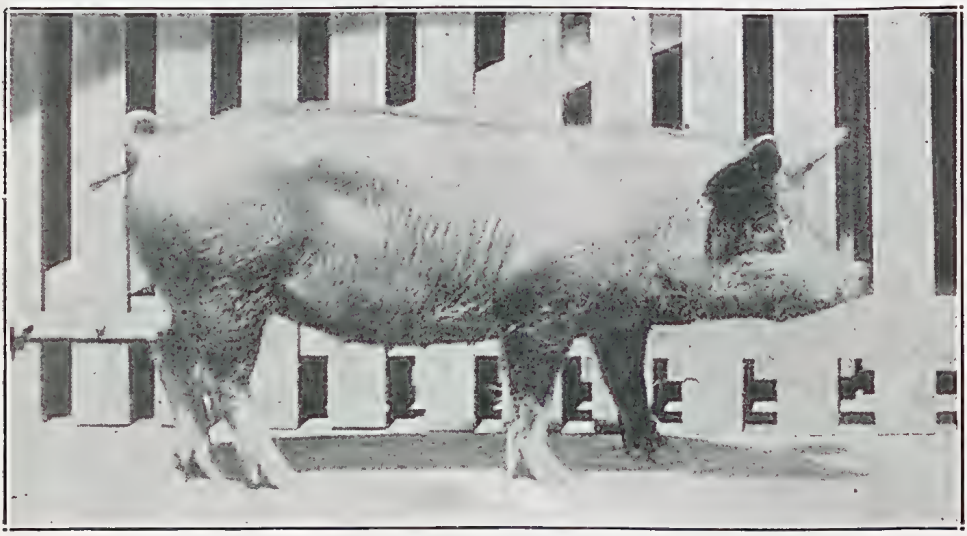

PLATE 122 (Fig. 5).

PLATE 123 (Fig. 6).

Figs. 5 and 6 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 5 is too low in condition to mate to the best advantage, while the sows shown in Fig. 6 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders as their breeding is doubtful and there are plenty of better type sows available at comparatively low prices.

**Selection.**

The first pick of a litter or of a special line is, of course, always placed at a higher value than the second, third, or later selection; this is, of course, but natural and is quite in order in the business world. All things considered, then, it is somewhat difficult to indicate just the amount one might have to pay for any particular line of stock offered.

In general, however, it might be taken as a fairly reliable guide under Australian conditions that a good breeding sow is worth not less than three guineas at from two to three months old. This is a low value in the South, where the demand is more permanent, and where the value of stock is better appreciated. "Six guineas each," the Victorian breeder would be inclined to remark if asked the question referred to, and much the same conditions rule in New South Wales. In the other States values of from three to five guineas each at two or three months rule. Boar pigs are usually considered more valuable than sows. Some studs—like Gatton College—have a range of values allowing one guinea more per head for boars than for sows. It is all a matter of arrangement.

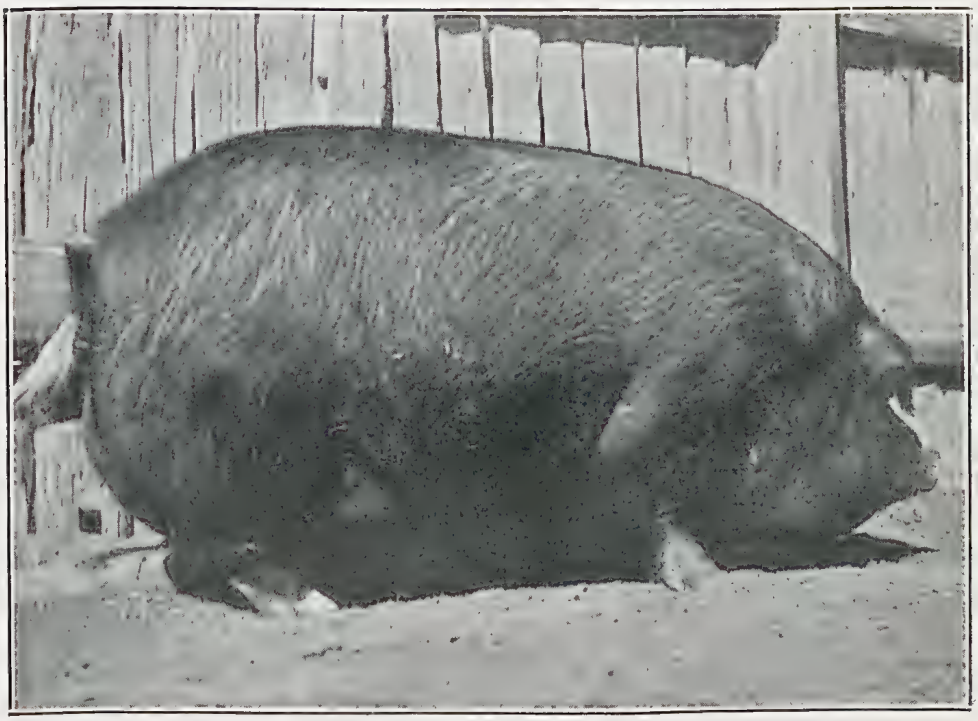

PLATE 124 (Fig. 7).

Fig. 7 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from such troubles as heat apoplexy as well as milk fever. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers and crew on the steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening, and had to be sold to the butcher.

**Grade Sows.**

For ordinary breeding sows (not pedigreed) values must be based on the actual "meat" value of the animal. One cannot expect to purchase selected breeding sows at less than their market value. In fact, a seller is justified in asking a higher value for the pick of the stock available. In the case of ordinary breeding sows, therefore, values may be placed at from three guineas to, say, six guineas at from, say, four to eight months old with lower or higher values according to age. Ordinary breeding sows quoted as "in pig" should be worth ten guineas each upwards if they are of good quality and breeding.

**Stud Sows.**

Stud sows could be valued at not less than three guineas at two to three months old up to, say, twelve guineas or more as yearlings. Sows quoted as "in pig" are worth more than sows that have not been stinted (mated), though there can be no guarantee that a sow will hold to the service of the male, and no responsibility should be accepted by seller or buyer unless by special arrangement.

Especially selected show sows and prominent prize-winners would, of course, carry a higher value than the above. The same also applies in the case of the boar, and values of from fifteen to fifty guineas might be referred to as reasonable where the quality and reputation of the animal justifies the payment of higher values.

In each case it is a matter of arrangement as to whether the price covers cost of delivery in crate on rail, steamer, or other conveyance, and as to whether crate is to be returned or be paid for. Crates in themselves are worth from twenty to thirty shillings or more each if well made and suited to the job. Rail freights and other expenses must be arranged for, and unless otherwise specified, it can be taken for granted that the buyer takes all risks once the animal is safely delivered at point of despatch.

PLATE 125 (Fig. 8).

Fig. 8 is a prize-winning Gloucester Old Spot sow. At the time this photograph was taken this sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her family.

A word in conclusion in regard to the condition of animals at the time of despatch. Nothing is more disgusting to the buyer than when the stock he has purchased arrive at their destination in a dirty, filthy condition, infested with hog lice or other parasites. The seller's reputation is at stake in all these matters; hence every effort should be put forward to ensure safe and satisfactory delivery.

It should be needless to add that in a country like Australia, where distances are great and where means of transport are often comparatively slow, ample notice should be given of the despatch of stock; and when the stock are despatched, especially stud stock, the breeder should see to it that all pedigrees, prize records, and other information are promptly supplied.

# Answers to Correspondents.

## BOTANY.

*Replies selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—*

### Swamp Mahogany.

A.H.H. (Byron Bay, N.S.W.)—

Your specimen is *Tristania suaveolens* var. *Glabrescens*, a form of the Swamp Mahogany. The tree is fairly common in Northern New South Wales and coastal Queensland, and is generally regarded as the most important timber for piles in sea water. Your specimens only differ from the normal form in that the leaves are smooth and not hairy, hence the name var. *Glabrescens*.

### *Gardenia Globosa*—"Wedding Bells."

T.B.T. (South Johnstone)—

The flowering tree you call "Wedding Bells" is *Gardenia Globosa*, a small tree that rather likes shady situations in the garden, and bears large white bell-shaped flowers, but we cannot be sure of this, as other trees are known as "Wedding Bells," for instance, *Datura Arborea*, which bears long, pendant, white flowers about 6 inches long. The former is harmless but the latter is poisonous.

### Hairy Indigo—Rattlepod.

R.M.F. (Mundubbera)—

The plant with small pods and red flowers is *Indogofera hirsuta* or Hairy Indigo, a very common weed in Queensland, mostly found on waste land, but also fairly common in places of ordinary pasture country. It is not known to be poisonous in any way. Besides Queensland, it has a wide distribution in other countries going from Malaya to India.

The plant with large velvety pods is *Crotalaria juncea*, a species of Rattlepod. Like the other plant it has a wide distribution, and though nothing definite has been proved against it, it belongs to a dangerous genus, which contains other plants, both here and abroad, known to be poisonous to stock.

### "Bullock's Heart."

F.F.L. (Calliope, Boyne Valley)—

It is rather hard to name specimens from leaves alone, but we should say there is no doubt your tree is the "Bullock's Heart" (*Anona reticulata*), a plant of the custard apple family (Anonaceæ). It is a native of tropical America, but is widely cultivated in the tropical regions of the whole world. It is only occasionally seen in North Queensland gardens. The fruit is sweet, but insipid, and is not to be compared with the common custard apple. This tree is really the common custard apple of most parts of the world, the fruit known in Australia as custard apple being known abroad as sweet sop. We should say that Calliope is altogether too cold for the fruit to set.

### *Mukia scabrella*—"Potato Bush."

W.C. (Biloela)—

The small climber with red berries is *Mukia scabrella*, a plant fairly common in different parts of Queensland, but for which we have not heard a common name. It is a member of the *Cucurbitaceæ*, and, though little is known of the properties, some of its allies are very poisonous, particularly the berries, and on this account the plant should be destroyed where it is found growing.

The plant with large green berries is a species of *Solanum* or "Potato bush." This genus is a large one, and the specimens do not allow of specific determination. However, most of the species bearing green berries possess a poisonous property, Solanine. On this account the plants must always be looked upon with suspicion.

**Fungus.**

P.J.S. (Quilpie)—

Mr. H. A. Longman, Director of the Queensland Museum, has handed us the specimen of a fungus from you. It is a fungus of the Family *Polyporaceæ*, which includes the common Shelf or Bracket Fungi, found on trees and logs. The one you send we should say is *Fomes lucidus*, fairly common in coastal Queensland on dead timber and at the base of trees. It takes many forms, and the finding of the plant so far west is of great interest, and the specimen makes a valuable addition to our Museum collections. Some species of the *Polyporaceæ* are extremely hooflike, and on this account are known as Hoof Fungi.

**Flannel Weed.**

J.G.G. (Cooroy)—

Your specimen is *Sida cordifolia*, the Flannel Weed, a common weed widely spread throughout the tropics of the world. It is a great pest around some of the towns and townships of North Queensland, and for some years past to a minor extent in Southern Queensland, but in the last season it seems to have spread considerably. It has very little value as a fodder, though quite wholesome; the hairy nature of its leaves and the fibrous nature of its stems making it of very slight value. Regarding eradication, in small areas hand pulling is of course the most effective. In larger areas, cutting off below the surface of the soil, or, where the land is not wanted for some little time, spraying with any of the commercial weed killing preparations should prove successful.

**Poison Peach.**

J.H. (Miriam Vale)—

No. 1 is *Trema aspera*, the common Peach Leaf Poison Bush or Poison Peach. The leaves of this shrub at times develop a prussic acid yielding glucoside, and if eaten in quantity then may cause trouble. The plant is also supposed to cause trouble through the indigestible nature of its fibrous twigs, bus possibly its dangerous tendencies have been much over-rated, as at times stock eat large quantities of Poison Peach without apparently any ill effects following.

No. 2 is *Pipturus argenteus*, a shrub or small tree common in coastal Queensland, and not known to be poisonous in any way though closely related to the Poison Peach.

No. 3 is *Trema orientalis*, a small to medium-sized tree fairly common in coastal Queensland, from Bundaberg northwards. It is related to the common Poison Peach, but is not known to be poisonous in any way.

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**Sheep Manure as a Fertiliser.**

R.W.S. (Woombye)—

Your inquiry regarding the value of sheep manure as a fertiliser was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—"Sheep manure varies enormously in its composition, but is generally of poor fertilising value, only worth about £1 3s. per ton, and would hardly pay for freight and other charges. The results of using such manure have been very disastrous, as it introduces a large number of weeds in pineapple and banana plantations."

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## PIG RAISING.

*Replies selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—*

**Production of Good Types.**

A.C. (Tolga)—

There is no reason why grain or greenstuff plus mineral matters and water should not be beneficial in producing good type pigs, but it would require some system to keep up a continuous supply of food in your district during the dry spring months. Lucerne hay may be fed to pigs to advantage, but it is sometimes necessary to feed it in a soaked condition at the start to get the animals accustomed to it, particularly breeding sows, and it

is to them specially we advise feeding the more bulky foods. Peanuts are good for very young pigs, but should always be omitted from the rations of fattening pigs.

**Pig Ailments.**

H. (Clifton)—

Many pigs suffer each year from respiratory troubles (coughs, colds, pneumonia, pleurisy, &c.) as a result of neglect in housing and through being kept in low-lying damp or even wet muddy yards and cold draughty pens, in which there is no bedding and in which dust, dirt, mud, &c., accumulate. Cough in pigs is often an infectious complaint, especially among very young pigs that are not thriving as well as they should. In treating pigs for these complaints it is well to understand that a cure cannot be expected merely from the administration of medicine, in fact it is very risky administering medicine to pigs with affections of the throat and lungs, consequently the objective should be first of all to clean up the pens and yards, provide clean dry accommodation, roomy grazing areas, and good succulent herbage grass, together with an abundant supply of clean drinking water. The next step is to provide a good variety of foods, and balanced rations. It pays to warm the food given to pigs during cold and wet weather, especially to young pigs. The use of cod liver oil in tablespoonful doses daily to each of the pigs that are sickly is recommended, and it would pay you to secure a gallon or two of this oil from wholesale druggists. Provide charcoal and bonemeal, and as an addition we advise the use of small quantities of lime water to the food. This is not an expensive item, and its provision need not necessarily mean much extra labour. It is advisable to isolate all such pigs from the healthy ones, and to give the sickly stock very special attention.

**Feeding Pigs.**

H.J.T. (Nambour)—

Our experience has been that it does not pay to feed an excess of any particular food whether it be stored or fresh food, or even milk or grain. The best results are obtained when balanced rations are fed, and this can only be attained by a combination of such rations. For instance, maize is a fattening food, it has very little protein or flesh forming value, and pigs fed entirely on maize are liable to develop paralysis and similar diseases and be slow growers. On the other hand, lucerne is a nitrogenous (flesh forming) food, but lucerne will not fatten to anything like the same extent as is the case where lucerne and grain are fed in combination. Ripe bananas are a fattening food, but will only be of use where they are fed in conjunction with flesh-forming foods, such as lucerne, &c. A good water supply and mineral matters like charcoal, bonemeal, &c., are essential, while attention to the accommodation of the animals, and the provision of suitable grazing areas and clean dry sties are equally necessary to the success of any branch of stock raising. This does not indicate that expensive accommodation and a large capital are necessary before one can venture into the business.

The Agricultural Chemist (Mr. J. C. Brünnich) remarks in reply to your other inquiries.

1. A good stock lick for the North Coast District is made up by mixing 33 lb. of coarse salt with 66 lb. of Nauru phosphate (finely crushed). After mixing moisten with a little molasses.
2. Waste bananas should only be fed to pigs when ripe, green bananas would be dangerous. The feeding value would be about the same as sugar beets, swedes, or turnips.

**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

*Photo.: Jean Easton.*]

PLATE 126.

Evening draws her mantle slowly o'er a prosperous land.

*Photo.: Jean Easton.*]

PLATE 127.

Coochin Coochin, one of Queensland's historic Station Homesteads.

# General Notes.

**The Royal Society of Queensland.**

The Ordinary Monthly Meeting was held in the Geology Lecture Theatre on 29th April, 1929.

The President, Professor J. P. Lowson, was in the chair, and about thirty members were present.

Miss D. Hill, B.Sc., Miss N. Holdsworth, and Mr. L. F. Mandelson, B.Sc., Agr., were nominated for ordinary membership.

Dr. F. W. Whitehouse exhibited the following fossils:—(1) Flowers of *Williamsonia*, associated with the fronds of *Ptilophyllum*, from the Jurassic deposits (Walloon series) of Bymount, north of Roma; (2) Specimens of a new species of *Calceola* from the Devonian beds of Ukalunda, North Queensland (collected by Mr. J. H. Reid; (3) *Stringocephalus* sp. from the Devonian limestone of Calcium, North Queensland. *Calceola* and *Stringocephalus*, index genera of the Eifelian and Givetian, respectively, of Europe are thus recorded for the first time from Australia.

Dr. W. H. Bryan exhibited some rather rare rocks from Milford Sound, New Zealand, which had been presented to the University of Queensland by Dr. P. Marshall. The rocks comprised Harzburgite (Saxonite), Dunite, Enstatite, and a perfectly white olivine-carbonate rock. Specimens of Dunite and Harzburgite from the type areas were also shown for purposes of comparison. Mr. D. A. Herbert exhibited (*a*) *Hydrodictyon reticulatus* from Lake Manchester; (*b*) *Craterium confusum*, a myxomycete from Wooloowin; (*c*) *Ustilago violacea*, a smut fungus attacking *Carex pseudocyperus* from Kuraby; and (*d*) a French bean showing polyembryony. The first three are new records for the State.

Mr. A. K. Denmead exhibited a small fossil identified by Mr. R. A. Keeble as belonging to the family *Diplograptidæ*, from Brisbane schists (Middle of Bunya series), of Tweed Heads. The age was considered to be Top of the Ordovician or Lowest Silurian.

Mr. J. E. Young exhibited a piece of coral containing a crab-gall produced by the female of *Haplocarcinum marsupialus*.

Mr. C. T. White exhibited specimens of (1) *Ficus Baileyana* Domin. from trees growing in Botanic Gardens, Brisbane. This tree was originally named by F. M. Bailey as *F. macrophylla* Desf. var. *pubescens*, and is related to *F. macrophylla* Desf. on the one hand and to *F. rubiginosa* Desf. on the other, but is distinct from either and seems worthy of specific rank. It is common in cultivation, and specimens are to be found growing in the Botanic Gardens at Brisbane, Sydney, and Adelaide. Both Bailey and Domin record it for the rain-forests of South Queensland, but this, Mr. White thinks, is pure guesswork, as though common in cultivation the plant has not as yet been found in a wild state. Specimens of *F. macrophylla* Desf. and *F. rubiginosa* Desf. were also shown for purposes of comparison; (2) Specimens of a small tree belonging to *Eucalyptus* or allied genus growing on sandy hills at Plunkett. The exact botanical position of this tree is a matter of doubt until flowers have been collected.

Mr. J. B. Henderson exhibited an Analytic Quartz Lamp. This is a mercury vapour lamp so fitted with two Wood's filters that ultra-violet rays are projected horizontally and vertically. The vertical rays fall inside movable black curtains, so that specimens may be examined for fluorescence in daylight. The effect of the ultra-violet rays was shown on various drugs and chemicals, also on papers, minerals, and precious stones.

Mr. C. Morton exhibited specimens of Rutile (red) surrounded by a zone of Ilmenite (black) in rounded as well as roughly crystalline forms up to 2 inches in maximum dimensions. They were obtained from shallow alluvial deposits near the Burrandowan road, about 22 miles west of Kingaroy. The country rock is gneissic granite, in which similar specimens were found to occur as isolated individuals.

Dr. E. Marks exhibited two rocks, a trachyte and a tuffaceous conglomerate found at Upper Brookfield.

Dr. Whitehouse, Dr. Bryan, Dr. Marks, and Messrs. White, Jackson, Massey, Denmead, and Jones commented on the exhibits.

The following officers were elected at the Annual Meeting of the Royal Society:—President: Professor J. P. Lowson, M.A., M.D.; Vice-Presidents: Professor T. Parnell, M.A. (*ex officio*) and Mr. J. B. Henderson, F.I.C.; Hon. Secretary: Mr. F. A. Perkins, B.Sc. Agr.; Hon. Librarian: Mr. W. D. Francis; Hon. Treasurer:

Mr. E. W. Bick; Hon. Editors: Mr. H. A. Longman, F.L.S., C.M.Z.S., and Dr. W. H. Bryan, M.C.; Hon. Auditor: Professor H. J. Priestley, M.A.; Members of Council: Dr. C. D. Gillies, M.B., B.S., M.Sc., Professor R. W. Hawken, B.A., M.E., M. Inst. C.E., Mr. D. A. Herbert, M.Sc., Dr. T. G. H. Jones, A.A.C.I., Mr. R. Veitch, B.Sc.

Mr. W. G. Wells was nominated for ordinary membership and Mr. C. Schindler for associate membership.

Professor J. P. Lowson was inducted to the position of President for 1929. Professor T. Parnell delivered his Presidential Address entitled "Modern Developments of Physical Science." On the motion of Professor R. W. Hawken, seconded by Mr. J. B. Henderson, a vote of thanks was accorded the retiring president for his address. A paper by Dr. T. G. H. Jones and Mr. F. B. Smith, B.Sc., on "The Volatile Oil of Queensland Sandalwood" was laid on the table. Mr. H. A. Longman expressed the Society's appreciation of the presence of His Excellency the Governor.

**Staff Changes and Appointments.**

The following transfers of District Inspectors and Inspectors of Stock have been approved:—

District Inspectors of Stock.—Messrs. W. R. Holmes, from Townsville to Warwick; J. J. Ashe, from Mareeba to Townsville; E. C. Lake, from Bowen to Mareeba.

Inspectors of Stock.—Messrs. J. B. Cardno, from Nanango to Bowen; J. Bishop, from Kingaroy to Nanango; W. Ford, from Boondooma to Kingaroy; L. P. Doyle, from Julia Creek to Camooweal; E. T. Lewin, from Toowoomba to Cloncurry; S. C. Allan, from Helidon to Julia Creek; S. J. Monaghan, from Crow's Nest to Toowoomba.

The position of District Inspector of Stock and Brands, Bowen, has been abolished.

The position of Manager, State Nursery, Bribie Island, has been abolished, and Mr. T. R. E. Mitchell, Manager, State Nursery, Bribie Island, has been appointed Acting Manager, Pawngilly Banana Experiment Station.

The designation of the positions of the following Officers of the Field Staff of the Department of Agriculture and Stock have been changed to "Instructors in Agriculture" and such Officers have been appointed Instructors in Agriculture:—

Messrs. O. L. Hassell, Assistant Instructor in Agriculture, Atherton; W. H. Bechtel, Acting Assistant Instructor in Agriculture, Kairi; S. M. Smith, Agricultural Field Assistant, Brisbane; R. A. Tarrant, Agricultural Field Assistant, Atherton; W. R. Straughan, Agricultural Field Assistant, Rockhampton; and A. Hamilton, Agricultural Field Assistant, Townsville.

Mr. Bechtel will continue to perform the duties of the position of Manager, State Farm, Kairi.

The designation of the position of Senior Field Assistant, Cotton Section, held by Mr. N. E. Goodchild, Maryborough, has been changed to "Instructor in Cotton Culture" and Mr. Goodchild has been appointed to that position, at Maryborough.

Mr. E. Pickering, of Eumundi, has been appointed Chairman of the Honey Board, and Mr. S. J. Howe, of Woombye, Chairman of the Strawberry Board.

Mr. C. R. Noyes has been appointed Chairman of the Moreton Local Sugar Cane Prices Board during the absence of Mr. S. L. Stormonth, and Mr. S. Pagano has been appointed Canegrowers' Representative on the Mourilyan Local Sugar Cane Prices Board, vice Mr. J. F. McCutcheon, resigned.

Constable C. W. Allen, Ravenshoe, has been appointed Temporary Acting Inspector of Stock whilst he is stationed at Ravenshoe, and has also been appointed Inspector of Slaughter-houses.

The appointments of Messrs. M. Flanagan (Bundaberg), F. A. Johnson (Willowburn), A. Black (Oxley), and W. L. Conn (Murarrie) as Inspectors of Slaughter-houses, have been confirmed as from 16th November, 1928, 19th November, 1928, 19th November, 1928, and 29th November, 1928, respectively.

Messrs. J. Macfie (Pomona), H. Lambert (Woombye), and R. J. Rollston (Brisbane) have been appointed Assistant Inspecting Cane Testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Bundaberg, respectively.

Acting Sergeant S. J. Selby, of Babinda, has been appointed Inspector of Slaughter-houses.

Mr. W. Gibson has been appointed Millowners' Representative on the Bingera Local Sugar-cane Prices Board, vice Dr. A. J. Gibson, resigned.

The services of Mr. J. C. Pryde, as Temporary Inspector of Slaughter-houses at Toowoomba, have been continued for a further period as from 12th May to 11th July, 1929, during the absence of Mr. Tanton on sick leave.

Mr. J. L. Hodge, of Hendra, Brisbane, has been appointed Instructor in Sheep and Wool, on probation for a period of six months.

Messrs. E. C. Dunn (Taabinga Resumption, via Kingaroy) and J. J. Shelvey (Hendra, Brisbane) have been appointed Inspectors of Stock, on probation.

### Successful Science Students.

Among the successful students at the last examinations of the Faculty of Science of the Queensland University were Mr. E. J. Ferguson Wood of the Bureau of Sugar Experiment Stations, Department of Agriculture, who obtained his degree of Master of Science, and Mr. W. A. T. Summerville of the Division of Entomology, Department of Agriculture, who obtained his degree of Bachelor of Science. Both students are young Queenslanders with very creditable Departmental and academical records, and are already well known to readers of the Journal as contributors on science subjects.

### The Minister at Kilkivan.

The Hon. Harry F. Walker (Minister for Agriculture), in opening the Kilkivan Show on 29th May, complimented the ladies on their very fine displays of fancy work and culinary. He was impressed with the quality of the farm produce, which showed the progress made by the district in recent years in those lines, and he suggested that samples of the potatoes and maize should be exhibited in Brisbane. He eulogised the work of the students in the technical classes in the Rural School. Dealing with the dairy stock, Mr. Walker said that he had been informed by the judge that the Jersey bull shown was one of the best in Queensland. It was a great tribute to the breeder. There were also nice bulls in the Ayrshire and I.M.S. classes. The breeders were doing a great work for the whole of Australia, as by the improvements of herds and conservation of fodder they must increase their quota of exports.

### Royal National Show—Ground Improvements.

A meeting of the Council of the Royal National Association was held on Thursday, 30th May. The chairman (Mr. J. Hiron) presided.

The acting secretary (Mr. H. W. Watson) reported that great general progress had been made in organising details as affecting the 1929 show. The district shows held during the month, many of which had been visited by representatives of the Council, had been attended with great success, and, what was of most importance, the general quality of exhibits in live stock and agricultural produce showed considerable improvement. The Royal National Association was now within ten weeks of the annual show, and, as it was possible to estimate more definitely what the possibilities were, he was confident that the 1929 effort would register that step forward which had most regularly marked efforts during more recent years.

The ground improvement programme outlined by the Council at the commencement of the present financial year had been steadily proceeded with and the wages sheet of the association exceeded £1,500 per month, exclusive of the heavy contract work which had proceeded during this period. The beef cattle and pig pavilions were now complete. The new concrete wall formation had been completed and was receiving its rough cast finish. The demolition of the old smokers' stand and adjoining buildings and the substitution of the fine wall and the building up of the rampway was regarded as one of the finest improvements to the grounds effected by the Council. Extensions had also been made to several of the refreshment rooms and greater facilities provided in connection with this most important service of providing the public with the necessary refreshments. The roads in No. 2 area had been raised to the extent of 2 feet and the centre and dry walk-ways in this area should now hold in any weather.

The motor pavilions, which the association was providing for the housing of motor exhibits, were in a state of preparedness, and it was recognised that the 1929 Royal National Show would see the greatest motor show yet staged in this State, covering some 60,000 square feet. The erection of the new fruit and horticultural pavilion was the last of the heavy improvements to be effected in preparation for the 1929 Show. The report was adopted.

### Sugar Assessments.

The Sugar Assessments for the forthcoming sugar season have been fixed as follows:—Assessment under Regulation of Sugar Cane Prices Acts—1¼d. per ton on every ton of sugar-cane received at mills. Assessments under Sugar Experiment Stations Acts—1d. per ton on every ton of sugar-cane received at sugar works. Cane Pest Boards Assessments—Plane Creek, 1d.; Mackay District, 1d.; Lower Burdekin, 2d.; Tully, 1½d.; and South Johnstone, 2d.

### Citrus Levy Regulations.

These Regulations have been further amended to provide that, after the 12th April, 1929, the levy shall be at the rate of 2d. per bushel case, 1d. per half bushel case on all citrus fruit marketed, and 8s. per ton payable on all citrus fruit sent forward to canners, &c. The proceeds of this levy shall be expended half in the interests of the citrus fruit section of the fruitgrowing industry of Queensland and the balance only upon advertising in the interests of the growers concerned. The Regulations will be effective until 31st December, 1929.

### A Bright Fruit Journal.

It used to be known as "Nicko's," the nick-name of its founder, that great-hearted and good Australian, George Nicklin. Then it was called "The Australian Fruitgrower, Fertiliser, and Poultry Farmer," and now, having bought itself a new overcoat, it has become "The New Australian Fruitgrower." At all times it is one of the cheeriest and brightest of our exchanges, and still wears its friendly grin and carries a warm shake or a hard punch in either hand. Its shake is preferred to its punch, but even that is delivered in a truly sporting way and always with a kindly smile behind the "hand-out." On every page is a glint of Queensland sunlight, brightening the wisdom and counsel of its columns. Like the industry it serves it is all-Australian in production. As a journal for the fruitgrower it compares favourably with any of our exchanges, and it should find a ready welcome on every orchard.

### French Honour for Departmental Officer.

Count Gontran de Tournouer, B.Litt., Departmental Librarian, has been awarded the honour of Chevalier of Agricultural Merit, on the recommendation of Marshal Petain, in recognition of his services to General Pau's Mission to Australia. Count de Tournouer also received recently the decoration of Officier d'Academie from the French Government as a recognition of other services. He has been for a number of years a regular and able contributor to French and other periodicals on agricultural and kindred subjects. Prior to enlisting with the Australian Imperial Force, with which he served on Gallipoli, in Egypt, and in France, Count de Tournouer was engaged in the sugar and grazing industries in Queensland. He has travelled extensively in little known countries and, besides being a very fine linguist, is a gifted and versatile writer, and his stories and sketches have brightened the pages of several Australian journals. Count de Tournouer is a good Australian as well as a distinguished son of France.

### Points in Planting Fruit Trees.

The roots of deciduous trees commence growing in the spring long before there is any move in the tops, and it is an advantage for the trees to be in their permanent positions when this first root movement takes place. Early planting, say, June and early July, is therefore advocated. The soil must not be too wet, of course, or it may become puddled.

Well-grown trees, one year from bud or graft, with well-developed roots are preferable. Long roots are very troublesome to settle satisfactorily when planting, and it is better to cut them back to about 8 inches. The bottom of the hole should have a crown in the centre so that the roots can be spread out with a downward tendency.

It is most important that the fine soil be rammed well in with the heel to bring it in close contact with the roots as the hole is filled in. The top of the hole should be left loose to act as a mulch. If planting when the soil is dry cannot be avoided, the holes should not be completely filled, and each tree should receive 8 or 9 gallons of water; when that has completely soaked away the hole should be filled up with dry, loose soil. A watering in this way is very useful in settling the soil around the roots, but care should be taken to avoid tramping close around the tree while the soil is soaked. The tree should be cut back to the desired height after planting.

### A South Coast Sanctuary.

Previous Orders declaring sanctuaries in the Southport and South Coastal districts have been revoked and a further Order in Council has been approved, declaring the coast from the mouth of Coomera River to Point Danger and inland for a depth of two miles, to be a sanctuary for animals and birds. This area includes the town of Southport and the islands situated between Stradbroke and the mainland.

### Open Season for Wild Ducks and Geese.

By an Order in Council the open season for wild ducks and geese in the No. 2 district of the State, which was declared by a recent Order in Council, has been varied. That Order in Council declared the open season for the whole of No. 2 district, to operate from the 1st June to the 31st October, but it has now been decided that so far as that portion of No. 2 district, south of the 22nd parallel is concerned, the open season will extend from the 1st July to the 31st October next. This, in effect, will mean that a close season will be in force in the Rockhampton, Gladstone, St. Lawrence, Clermont, and intervening districts, until the 1st July next.

### Pig Farmers' School at Gatton.

The syllabus arranged for the forthcoming school of instruction for pig farmers, to be held this month at the Gatton College by the Departments of Agriculture and Stock and Public Instruction, is a very comprehensive one, and includes the following lecture course:—

| Subject. | Lecturer. |
|---|---|
| Agricultural Education<br>Microbes<br>Principles of Feeding | Professor J. K. Murray, B.A., B.Sc., N.D.D., Principal of the College. |
| Economic Phases of the Pig Industry<br>Description of Breeds<br>Design and Construction of Piggeries<br>General Care of Pigs<br>Judging<br>Results of Cross Breeding<br>Preparation of Pigs for Show and Market | Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising. |
| Weighing and Branding | Mr. John Hardcastle. |
| Fodder Crops | College Staff. |
| Anatomy<br>Diseases of the Pig<br>Improvement of Breeds<br>Physiology<br>Administration of Medicines<br>Post Mortem Examinations | Major A. J. McKenzie, Lecturer in Animal Husbandry. |
| Commercial Pig Farming | Mr. R. G. Watson. |
| More Money in the Farmer's Pocket | Mr. J. F. F. Reid, Editor of Publications, Department of Agriculture and Stock. |
| Pig Hygiene | Mr. H. G. Cheeseman, Senior Slaughtering Inspector, Department of Agriculture and Stock. |
| Farm Book and Record Keeping | Mr. J. H. Woodward, Senior Clerk, Queensland Agricultural College. |
| Soils | The Principal, Technical College, Ipswich. |
| Disinfectants<br>Tuberculosis in Pigs | Mr. C. J. Pound, Government Bacteriologist. |
| Marketing Pigs | A Representative of the Bacon Curers' Association. |
| Pig Clubs | The Organiser of Agricultural Projects, Department of Public Instruction. |

## Open Season for Opossums.

By an Order in Council an open season of one month for the capture and destruction of opossums has been declared in all districts in the State. This open season will extend from the 8th July, 1929, to the 7th August, 1929, both days inclusive.

In giving favourable consideration to the question, the Minister for Agriculture and Stock (Mr. Walker) announced that the Government was influenced by the fact that protection has been afforded since 1st September, 1927, and reports called for and received from reliable sources indicate that in a number of areas the opossum is again in large numbers, and in the majority of districts where they thrived prior to the last open season they are again fairly plentiful.

A factor which was also given consideration in opening the season was the desire of the Government to provide employment for those who wished to take advantage of an open season and who at the time might not be absorbed in industrial undertakings. It is anticipated that a considerable sum of money will be also put in circulation as a result of the proceeds of the sale of furs.

The limitation of the open season to one month should ensure, at the end of the period, that sufficient numbers of opossums are left for propagation purposes.

An indication of the value of the opossum fur industry may be gathered from the fact that during the open seasons in 1926 and 1927 a total of 3,500,000 skins was sold at a value of £832,000.

The Minister also stated that he has under consideration the adoption of measures for the propagation of the opossum, which will tend to create breeding grounds for these native animals in districts most suitable for the purpose. He hopes, in this way, to provide regular supplies, and to ultimately place the fur breeding industry in the State on a systematic and profitable basis.

## New Objectives in Wheat-breeding.

Farrer achieved such wonderful success in wheat-breeding in Australia, particularly with his variety Federation, which is still grown largely in Victoria and New South Wales, that it was considered by many that the pinnacle had been reached, and that very little further progress could be made.

The work which has been continued by plant-breeders, writes the Director of Plant Breeding of the Department of Agriculture, New South Wales, has been rather in the direction of producing earlier varieties of high productivity, and both Canberra and Waratah are outstanding examples of the success of this objective. A change in the objectives in wheat-breeding, however, has necessarily been brought about in recent years through the increasing ravages of diseases, which take a heavy toll of the crop in some years. The present leading varieties—Federation, Waratah, and Canberra—all suffer from the effects of diseases in certain seasons and under certain conditions, while it is known that other varieties are not so badly affected. This indicates a varietal resistance or susceptibility which the plant-breeder must consider in the production of new wheats, if they are to be superior to the present varieties.

In his day, Farrer did not have to concern himself with breeding for resistance to flag smut, but this phase is now regarded as one of the most important objectives of the wheat-breeder. By keen observation, Farrer achieved a certain measure of success in breeding rust-resistant wheats, but in his time nothing was known of the specialisation of physiologic forms of rust, some varieties being resistant to some forms and susceptible to others, and Farrer could not, therefore, make the headway in this work, which is now being undertaken with a wider knowledge of the incidence and a better understanding of the inheritance of rust, and which, therefore, promises much greater success than Farrer achieved in this direction.

Other diseases are also being investigated from the varietal aspect to discover, if possible, whether any varieties have an inherent resistance which can be turned to account by the plant-breeder. Moreover, the wheat belt is extending each year into districts of more limited rainfall, and wheats of greater inherent drought resistance are needed than when Farrer was engaged in this task.

Though the task of the wheat-breeder has been rendered sterner and his problems more difficult since the time of Farrer, we can never detract from his wonderful work; firstly, because his Federation wheat has held pride of place for so many years, and, secondly, because many of the most promising varieties to-day in Australia still have a large mingling of Federation "blood."

## Men and Machines.

"There could be no more false, no more mistaken view," said Lord Londonderry in a speech at Newcastle, England, recently, "of the needs of industry to-day than the over-emphasis upon the present age as the mechanical age, in which the human element in manufacture has been practically eliminated, and the operative reduced to a mere machine-minder. While it is true that science and machinery enter ever more and more into the creative processes, this has not meant, and, as far as I can see, never will mean, the replacement of human skill. It has only meant a shifting, not a lifting, of the burden upon man. It has necessitated a greater use of the intelligence of the worker, and a smaller demand upon him for actual manual dexterity. Man himself still remains the most wonderful machine in the world, and, though his muscles may be called upon less and less, his mind, his intellectual powers, are being called into service more and more every day."

## Wintering Conditions for Bees.

The provision of good wintering conditions, by enabling the worker bees to conserve their energy, has an important influence on the honey-producing capacity of a colony.

The length of life of worker bees is governed by the energy they put into their work. For instance, during a honey flow, when the condition of the colony is normal, with young bees hatching freely, the bees put so much energy into their work that they become quite aged and usually succumb in six or seven weeks. If, on the other hand, any abnormal condition (such as the loss of the queen) takes place, then to some extent the bees will conserve their energy so that their lengthened life will give the colony a chance to recover. The period at which this conservation of energy is most desirable is during the winter, and it is at this season that the apiarist himself may help.

If wintered in a good hive with ample stores under favourable conditions, the young bees of a populous colony will come into spring with comparatively undiminished energy, so great is their power at this period of conserving their vitality. The case of a colony in a low-class hive, which has excessive space or insufficient stores, or which allows a draught through the cluster, is very different. The draughty state of the hive necessitates considerable activity on the part of the bees in order that the temperature may be maintained, and the extra energy expended shortens their lives proportionately. Insufficient stores cause the bees to economise and consequently lowers their vitality still further.

## Points in Packing.

Use a clean case with stout sides and flexible tops and bottoms.

If making cases, use nails of sufficient length and gauge to hold the boards.

Grade carefully for size and quality.

Avoid using an open edge pack where possible. Use a closed edge pack for first preference, and a flat pack for second preference.

Handle the fruit with extreme care—remember that much damage is caused by common rot organisms which gain entrance through a broken skin. Use a wrapper of sufficient size to completely cover the fruit, and finish the wrap over the stalk so that it will form a pad and prevent the stalk protruding through the paper and puncturing the apple next to it.

A little wood wool placed on the bottom of the case and on the top of the last tier protects the fruit.

To prevent cleats from splitting soak them in water before using.

Finish the pack with a slight bulge.

Do not pack slack—it causes bruising.

Do not place the case flat on the floor when nailing it down. Place battens underneath or use a nailing-down press.

The wiring of cases is strongly recommended; they increase the stability of the box. When wiring, the machine should be placed on the side of the case. The wires should be placed near the cleats at each end of the case.

Use a well-designed attractive label.

Mark your cases in accordance with the grading regulations. If using a stencil, see that the markings are easily decipherable. Plain, attractive markings facilitate handling of fruit and are of great assistance to both buyer and seller.

Do not walk over cases.

Sweep out trucks before loading the fruit, and stack cases on their sides, not on the bulge.

**Dipping of Lambs—A Southern Trial.**

The results of dipping trials at Bathurst Experiment Farm (New South Wales) this season confirm those of previous experiments, demonstrating that dipping has no detrimental effect on the growth of lambs if properly carried out.

Fifteen lambs were selected and divided into three equal lots. One lot was dipped in a carbolic dip, one in an arsenical powder dip, and the third lot was left undipped as a check. Fairly small lambs were selected so that they would not be sold in the first draft that went to market. The lambs were weighed prior to dipping (5th December) and again on 9th January, with the following results:—

| | Weight, 5th Dec. | Weight, 9th Jan. | Increase. |
|---|---|---|---|
| | lb. | lb. | lb. |
| Carbolic Dip .. .. | 64.2 | 77 | 12.8 |
| Arsenical Dip .. .. | 65 | 72.8 | 7.8 |
| Undipped .. .. .. | 64.4 | 74.6 | 10.2 |

Sheep should not, of course, be dipped when in an overheated condition, but lambs will naturally rush about more than older sheep. In trials carried out previously at Glen Innes Experiment Farm, lambs that had been driven around the yards until they were hot and breathing very quickly and then put through the dip showed no ill effects in their general appearance, and an average increase in weight of 12¾ lb. in five weeks was recorded. In some cases a slight difference, not amounting to a break, was subsequently noticeable at that part of the staple which would have been at the surface of the skin at time of dipping.

**Worms in Sheep—An Effective Drench.**

The efficacy of the copper sulphate and mustard drench for treatment of stomach worms in sheep has frequently been referred to in these notes. As the trouble is one which is occupying the attention of a good many sheepowners at present, details of the drench and method of administration are repeated.

To prepare the drench dissolve 4 oz. of powdered copper sulphate (bluestone) in a pint of hot water, using an enamel or earthenware dish. When thoroughly dissolved, add 4 oz. of mustard. Then add cold water to make up to 1½ gallons, using an enamel bucket or earthenware jar. This will be enough for 100 adult sheep, allowing for waste. The doses of the mixture are—

| | Ounces. |
|---|---|
| Grown sheep (4-tooth and over) .. .. .. | 2 |
| One-year-old sheep (2-tooth) .. .. .. .. | 1½ |
| Lambs .. .. .. .. .. .. .. | 1 |

If it is desired to use a weaker solution, the drenching mixture may be made up by taking the drench as prepared above and adding an equal quantity of water. The doses would then be 4 oz., 3 oz., and 2 oz., respectively.

Instead of the ordinary galvanised drenching tins, those made of sheet copper are to be preferred, as the action of bluestone on galvanised iron is highly corrosive, and such tins wear out very rapidly. Three different sizes of drenching tins are required to hold the respective doses mentioned above.

It is advisable to bring the sheep into the yards the night before, and to drench after a preliminary fast. No water should be allowed for two hours after drenching. The sheep should be drenched in the standing position, with the head held horizontally or slightly raised. The head must not be forced far back, or the drench given hurriedly, otherwise choking may result, or some of the liquid may enter the lungs and set up pneumonia.

*Drenching should be repeated in about fourteen days' time, and again if necessary one month later if the best results are to be obtained.* On properties where worm infestation is serious, regular systematic drenching should be adopted. It must be remembered that drenches simply destroy and expel the parasites, and do not render sheep immune. Thus the sheep will become reinfested by the many thousands of ensheathed larvæ still present in the pastures. By repeated drenching, say, at monthly intervals, these young parasites are destroyed as they get into the sheep, and before they are able to propagate to any extent. Thus by regular drenching it is possible to clear up the parasites in wormy areas.

## Regulating Dairy Production.

The desirability of "evening up" production throughout the year, and how it might be accomplished, was discussed by Mr. E. H. Filmer at a recent conference of South Coast (New South Wales) farmers.

By having, say, 10 per cent. of the cows calving every month, it was contended there would be a continuity of supply of fresh cows in the herd and a more steady flow of production, providing there was a supply of good feed, natural or conserved, all the year round. By such a distribution of production throughout the year the price obtained would be made more even and perhaps a shade improved. As things were, if the season was good a large percentage of the dairy farmer's product was exported, and returns were not always as good as the local prices. When winter came they found that butter was imported from other States. It was rather galling at times after exporting their so-called surplus at a loss on local prices to find that they had to import butter at a higher rate to fill requirements.

Another method of regulating the dairy herd was to keep the sire from the cows until, say, November or December, and then get them all in calf in a month or six weeks, and thus have them calving in September and October. By this means the whole herd would be dry during July and August, thus giving the farmer time to do some other work or to take a well-earned holiday. Further, the cows were dry at the least productive period (on natural pastures). The disadvantages of this system if generally practised would be over-production during spring and summer, necessitating export or storage, and a tendency to reduce the price, also the fact that butter factory plants and staffs would be idle, and he did not think that the inevitable dislocation all round would be in the best interests of the industry.

Another disadvantage would be that in a fair-sized herd of, say, sixty cows the farmer would probably have to keep two or more bulls. Added to this there was the fact that for ten months in the year the bulls were idle, and it was very probable if they did not become a nuisance to their owner that they would do so to his neighbours. Again, most cows when in season caused unrest among the remainder of the herd, which did not make for smooth and quiet working, and conditions in this respect would be proportionately worse.

He much preferred the first method. There was no two or three months holiday in it as against the second one, but once one got it going it made for smooth working, even production, and regular cheques.

## Surplus Combs—Fumigation for Wax Moth.

When combs have to be stored for any length of time care should be taken to prevent damage by the wax moth larvæ, for such combs are of great value for future development in the apiary. Bees will store honey in combs at times when they will not build out comb foundation.

As the pest is not so troublesome during the winter months, the removal of one comb from each body and the piling up of the bodies on four tins, so as to prevent damage by mice, will usually suffice as a protection. No cover or bottom board should be used, so that air may circulate through the pile freely. The room in which the bodies are stored must be bee-proof, to prevent any robbing by bees. Some apiarists place a wire cloth screen top and bottom of the pile. The combs should be examined about once a month during the winter, and any showing signs of infestation should be set aside for fumigation.

The piles should be treated in the following manner:—First scrape all propolis from the top and bottom edges of the supers, in order that the bodies may fit tightly and thus retain the gas. On top of each set of combs place a cloth about 10 inches square (doubled) and over this pour a tablespoonful of carbon bisulphide. Cover the cloth with two thicknesses of newspaper to ensure a tight joint, and place another body on top and treat in the same way, and so on with the remainder of the pile.

Great care is necessary in using carbon bisulphide, as it is a poisonous and very inflammable gas. Fumigation is best carried out under a verandah or in the open; if the work is done indoors there should be ample opportunity for the free circulation of air if risk to the operator is to be avoided. On no account should a light of any sort be allowed in the vicinity of the gas, as a spark is quite sufficient to cause an explosion.

Sulphur fumes are quite effective for the fumigation of slightly infested combs. To fumigate by this method, prepare four or five bodies of combs, take a pan containing red-hot coals, throw on to the latter a handful of sulphur, immediately

place over the pan an empty full-depth super, then the bodies containing the combs, and finally place a good close-fitting cover over all. The combs can be left over the fumes for an hour.

The carbon bisulphide treatment is the more effective, and is recommended if combs have to be kept over a fair period.

During the early spring populous colonies of Italian bees will take care of a few of the surplus bodies and combs.

Very heavily infested combs should be melted up.

## Silage is Real Money.

The market value of silage is not fixed, as is the case with hay. In nearly every case the fortunate farmer who possesses it regards it as of so much value to himself that he will not sell it. It has, however, a very definite market value. During a recent dry spell the manager of Wagga Experiment Farm (N.S.W.) was offered £8 per ton for pit silage. Considered from the point of view of its actual food constituents it may not be so valuable as hay, but its succulence is an important feature, and renders it of considerable value, particularly in a lean period, when succulent feed is the very class of which there is a special scarcity.

As farmers are beginning to appreciate, the security afforded by reserves of silage has a very real monetary value. The value of such a reserve is not merely its value as fodder—it is the value of the profits accruing from the enterprises which the reserve has made possible.

## Better Pastures for Dairy Cattle.

If stock have access to succulent pastures they are less liable to become affected with such troubles as rickets, bone-chewing, &c., which are generally associated with poor pasturage. Much poor land will produce infinitely better feed if it can be broken up and sown with suitable grasses and clovers. On some of the country implements cannot be worked, but winter-growing plants, such as Wimmera rye, Italian rye, Perennial rye, Cocksfoot, Sheep's Burnet, and Subterranean clover can be scattered in suitable places on these areas, writes the Agrostologist of the Department of Agriculture.

By having numerous small paddocks, rather than a few large ones, a system of rotational grazing can be adopted, and by establishing some paddocks of winter grasses and others of summer pastures, each can be grazed at the time when they contain their maximum amount of nutritive material. The grasses and clovers can thus be handled in such a way as to enable them to rest, recuperate, and seed at the correct time, thus maintaining the maximum degree of efficiency in each. Attention should be given to sowing mixtures of grasses and clovers most suitable for the district, and particularly those which provide feed at those times of the year when the natural pastures are at their worst.

If the property is well subdivided, the pastures can be utilised when the feed is most nutritious. Milking cows require palatable feed rich in protein, and the grasses should be fed off when the growth is young, but as the plants mature the fibre increases and the percentage of protein diminishes.

The use of fertilisers, such as superphosphate, stimulates the growth of grasses and legumes, and the amount of mineral matter in the plants is increased, particularly the elements lime and phosphorus, which are essential for the animals' development. Stock grazed on pastures deficient in these substances invariably become "bone chewers," but by feeding the pasture with fertilisers, the composition of the plants is considerably improved. Where a marked increase in the lime content of the soil takes place, the percentage of nitrogen in the pasturage also increases.

Stock prefer top-dressed portions of a paddock to unmanured sections, because—(1) They are obtaining more lime and phosphorus (two substances essential to the building up and maintenance of the animals' framework), and (2) the top-dressed pasture is more palatable and nutritious, and contains a greater amount of protein, due, mainly (*a*) to the increased growth of clovers and (*b*) to the increased percentage of nitrogen present in the pasture as a whole.

Therefore, by nourishing the pastures, not only is a greater quantity of feed obtained, but a considerable gain in the nutritive value of the plant is effected.

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### THE NATURAL FEEDING OF BABIES.

Every mother should realise how important it is that her baby shall receive his natural food—that is, his mother's milk. That milk has been supplied by Nature for that special baby, and is adapted to his special needs. Doctor Sir Truby King says, "A woman's milk is not her own. It is created for her baby, and the first duty of the mother is to ensure, by foresight, a proper supply of the only perfect food—the baby's birthright." Almost all mothers can feed their babies, if they desire to do so. If they have not a quite sufficient supply of milk for the baby's full needs, he must not be weaned on that account. Give him what there is, and finish his feeding with a little very slightly sweetened artificial food. At the same time try to increase the breast milk supply. This can and should be done. Any Baby Clinic nurse will show you how to do it. Even a little mother's milk is very valuable for the baby, and helps him to digest the artificial food which may be necessary. There are many reasons why breast milk is best for baby. As has been said before, it is his natural food, and contains in the right proportions all the food ingredients necessary for baby's growth and development.

#### Give the Infant a Good Start in Life.

The death rate among breast-fed babies is much lower than among artificially-fed infants. Statistics tell us that, of the babies who die in their first year, a large percentage of them are artificially fed. A breast-fed baby is much less likely to contract disease than one who is artificially fed, and, if illness is contracted, the baby fed on his mother's milk makes a quicker and better recovery than does the bottle-fed baby.

The child who is breast fed during his first year is stronger and healthier during his second year than the one who has been artificially fed.

#### The Wisdom of Mother Nature.

In addition to these advantages to the baby, there are advantages also to the mother's health. Besides this, mother's milk is always ready; there is no troublesome preparation of bottles and mixing of foods. Thus it is a great saving of time for the mother. It is always the right temperature, and is germ free. Also much money is saved that would, for the bottle-fed baby, have to be spent on infants' food, bottles, teats, bottle brushes, &c. So give baby what Nature meant him to have, his mother's milk, and leave cow's milk for the baby calf, for which it was intended. In addition to all of these reasons, the baby who is dependent on his mother for the food he receives is more devoted to her than the child who is satisfied to be fed out of a bottle, by anyone, and the mother more dearly loves the baby whom she has fed with her own milk. Some mothers wean their babies because they think they are not strong enough to nurse them. This is a mistake; the health of the mother is, in nearly all cases, improved while nursing her baby. Others think that their milk is poor in quality, because it is thin and watery looking. But analyses of many samples of mothers' milk have proved that this pale, watery-looking milk is quite rich in quality, and contains all the nourishment needed by the baby. Still others talk of "windy milk," and wean on that account, but wind is never drawn from the mothers' breasts. "Wind" in the baby's stomach is air that he has swallowed. Other frequently heard causes for weaning are frequent green motions, attacks of screaming after feeding, frequent vomiting, and loss of weight. These are nearly always due to indigestion caused by overfeeding, especially in the early days. Babies are often weaned because the mother thinks she is losing her milk. In many of these cases, inquiry elicits the fact that the mother is substituting one or more bottle feeds for breast feeds, or is "keeping the breast for the night," and bottle feeding during the day. There is no surer or quicker way of weaning baby

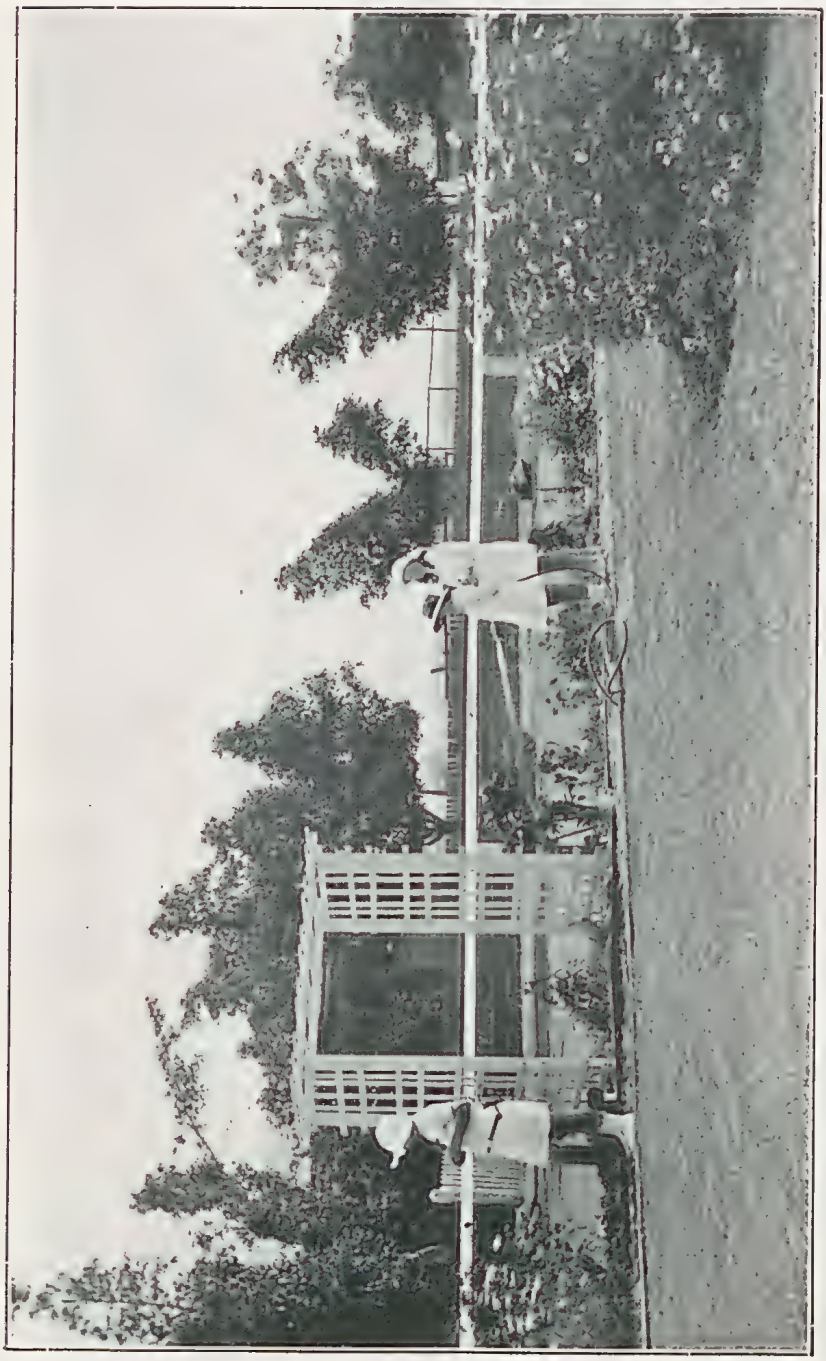

*Photo.: Dept. of Public Instruction.*]

PLATE 128.—IN A STATE SCHOOL GARDEN IN SUNNY QUEENSLAND.

than by these means. The best way of keeping up the supply of mother's milk is by the regular and vigorous sucking of the baby. Put baby to the breast every three or four hours during the day for from fifteen to twenty minutes. Give no night feeds from birth.

### The Best Food for the New Australian.

Another mistake which is often made, and which may result in baby's refusal to take the breast, is feeding him on sweet foods, condensed milk for instance, during his first two days of life, before the mother's milk comes in. If that is done, baby gets used to the taste of the artificial food, which is sweeter than his mother's milk. He also finds that taking milk out of a bottle is easier than sucking. As a result he fights and protests when put to the breast, and refuses to suck. This may also happen if the new born baby is given a "dummy," especially if this is dipped in honey or any other sweet stuff. The mother is worried by this refusal, and, in consequence, her milk supply decreases. Also, because baby has not taken the breast, more of the artificial food is given to him, and as a result he is soon entirely weaned.

Babies should never be given artificial food during their first two days. Give them plain boiled water only. If they required feeding then Nature would have supplied the food.

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## TWELVE BEST GARDEN ROSES.

The following interesting paper was read by Mr. B. Watkins, B.Sc., M.Sc., president of the Horticultural Society of Queensland, before members of the society:—

The title of this paper is one which may lead to the belief that I am going to name twelve roses which are considered to be the best twelve garden roses. Such is not the case; it is my desire to discuss those roses which have some claim to inclusion among the best twelve. There is really no finality to the question of the best twelve garden roses Experience with roses differs. One rose grower will find a particular variety an assured success, and a second grower reports the same variety to be a failure. Such is the case with the rose Hadley. It is temperamental—successful in one quarter and only mediocre in another place. No one person can list twelve roses as the best twelve for Brisbane—a personal list is the result of one's experience. Yet by collecting as many such lists as possible from growers in and around Brisbane and dissecting them a fair average indication is the result. Such a plebiscite should be made from time to time by the society, and the results published for the guidance of beginners. Southern societies treat this matter seriously, and a valuable guide to varieties to grow results from the voting.

Some years back the Brisbane "Sunday Sun" called for an expression of opinion from its readers as to the best twenty-four roses. The result of the plebiscite was as follows:—Maman Cochet, White Maman Cochet, Hadley, Radiance, Penelope, Lady Hillingdon, F. K. Druschki, Madam Abel Chatenay, George Dickson, Mrs. Herbert Stevens, General Macarthur, Laurent Carle, K. A. Victoria, J. J. L. Mock, Madam Segond Weber, Rhea Reid, W. R. Smith, Lady Alice Stanley, Duchess of Westminster, Madam Constant Soupert, Columbia, Alexander Hill Gray, Perle des Jardines, Star of Queensland. Many of these varieties must give way to better varieties of recent introduction.

Whilst on the matter of a plebiscite, there is a further point that deserves consideration. One is apt to be rather partial towards a rose and allow such partiality to blur one's general outlook when considering the best twelve, resulting in a list of one's favourites rather than an impartial, unbiassed opinion of the best twelve. My favourite rose is Reverend F. Page Roberts, and perhaps next comes Betty Uprichard; yet I would never consider either variety worthy of inclusion in the premier twelve. It is my desire to be impartial and non-dogmatic in dealing with this subject.

A good garden rose is one that possesses vigorous, strong growth, carries its flowers erect on long straight stems well above the foliage. The foliage should be disease resistant, and not readily shed. The variety should be in constant bloom, and the blooms should be capable of holding together under the various climatic factors characteristic of the area. The colour should be lasting, and the flowers carry at least three rows of petals. Such a definition rules out all the single and semi-single varieties and many roses which, although favourites, bloom only at limited periods, such as George Dickson.

In the above review the first varieties claiming attention are that trio of worthy roses—the Radiance family. In 1904 J. Cook produced a new rose named Cardinal, from Liberty, and an unnamed red seedling. Liberty is a red rose still prominent in many quarters, particularly its climbing form. Its progeny, Cardinal, is at present not listed locally. The same hybridist, by crossing Cardinal and Enchanterer, in 1908, produced probably the most popular garden rose both here and in America. This rose is known as Radiance, and is identical with Reliance. The rose is so well known it requires little discussion. A climbing form of Radiance from the South should be justly popular. In 1916 Radiance sported an identical variety in all but colour, and Red Radiance was listed by two Southern firms. Why Radiance should have thrown identical sports in two distinct gardens is a mystery. Just as much a mystery as that surrounding the fact that this same rose sported climbers in two distinct places at about the same time. A climbing sport from the Pacific Rose Company appears in Southern catalogues, whilst in the Oxley garden of Mr. Alfred Marshall a similar climbing sport appeared last year. Some years ago Mr. Marshall met with a similar experience when White Maman Cochet sported a climbing form in his garden, but was anticipated by a similar sport from the South.

The last member of the family, Mrs. C. J. Bell, or shell pink Radiance, originated in 1917 from the nursery of A. N. Pierson, one of the originators of Red Radiance. It has taken a little longer to find its way into commerce in Brisbane, but is a really beautiful rose of a delicate soft salmon colour worthy of a place in any garden.

The trio bears flowers which are identical in shape, being cupped and globular, and for that reason do not find a place among the exhibition roses, although at times they appear in the bud-to-full-bloom class. Of the three, I consider Red Radiance shows the best form, at times claiming attention from the exhibition viewpoint. All three possess a most beautiful and persistant perfume, and all drop their petals as a whole. In vigour I find Red Radiance foremost, with Mrs. C. J. Bell least vigorous, but nevertheless a vigorous rose. The same order is preserved in the case of floriferousness.

Though Red Radiance carries the name indicative of its colour, it is by no means a true red, but rather cerise. I do not think it should be classed as a red rose accordingly. In considering the most popular red rose, there should be no hesitation concerning the premier place. It is justly claimed by Etoile de Holland, sometimes called Star of Holland. I consider this rose, Radiance, and Red Radiance are the foremost trio of garden roses to date. Etoile de Holland stands almost supreme in every rose-growing country in the world. Originating from the Dutch nursery of H. T. Verschuren, in 1919, this rose rapidly became a favourite, and has maintained its premier place ever since. Its popularity can be readily understood when one considers its qualities. Its only fault, to my mind, is a tendency to weak stem, the very large size of the flowers accentuating this. This weakness can be minimised by the use of sulphate of potash scattered around the plant. Some incline to the opinion that this rose is too thin in petalage and lacks substance, but my personal opinion is that therein lies its greatest charm as a garden rose. It lacks the formality of an exhibition rose, but the giant petals, usually half recurved in the case of the outer row, give to the bloom a form and appearance which no amount of rose dressing could improve. The perfume is overpowering, and is described as a damask musk. In colour Etoile de Holland is a rich bright red overlaid with that blackish-crimson hue and velvety sheen so characteristic of the old H.P. reds. Its lasting qualities are exceptional, and as a house decorative it is hard to surpass. This rose is highly prized in England, America, and on the Continent, and stands very high in favour in Queensland.

Its history is interesting. According to the raiser, it is the result of a cross between two well-known reds—Hadley and General Macarthur. Further, General Macarthur, Liberty Richmond, and an unnamed seedling were utilised in producing Hadley. Accordingly, Etoile de Holland is an inbred rose, the more remarkable as it preserves the good points of both parents with just that one fault of weak stem, inherited no doubt from General Macarthur. The colour of Etoile de Holland can be traced as a blend of its two parents, but the tendency to blue so apparent in both parents is a very minor matter with the progeny.

This introduces two more red roses to our notice. With me Hadley is an assured success, and will always find a place in any garden with which I may be concerned. It is a consistant bloomer, giving very full, high pointed, well-shaped roses, though at times confused. The blooms are carried on long, wiry stems held very erect and carrying little foliage. Its perfume is delightful, and its lasting qualities are good, excepting that it is very subject to blueing at certain times. Occasionally also it gives small blooms inclined to be crippled, but its faults are

easily overshadowed by its merits. A climbing form of this red comes into commerce this year, and will be an assured favourite. I am not so keen about General Macarthur. It was first sent out by E. G. Hill in 1905, and at that time readily found a place in public favour. Many of our older rose growers still hold it in high esteem, but I think it must give way to worthier opponents. It opens rather flat, showing the centre rapidly, at times rather small in size, and it blues. A climbing sport of recent introduction, is a rampant grower, though not particularly free in bloom.

Two years after the introduction of General Macarthur, that worthy French firm of hybridists introduced a red rose named Laurent Carle, which remains to-day as a very popular rose. Not a particularly tall grower, yet always doing well, the rose maintains its position in public favour on account of its dark-red colour, sweet, rich perfume, good form and carriage, consistent blooming, and freedom from disease. A recently introduced climbing sport is a worthy addition to the red climbers. I find it the most consistent bloomer among the red climbers. In fact, among all climbers it is an outstanding variety on account of its freedom of bloom. In addition, it is a medium climber, and easily kept within bounds. In 1922 the firm of S. McGredy and Sons sent out a red rose under the name of Lord Charlemont. This rose has each year shown evidence of increasing satisfaction, and will take its place among our best garden roses. I first secured this variety as a novelty, and it never looked back. I received more genuine satisfaction from this particular plant than from any other rose I have ever grown. It gave me dozens of perfectly shaped, long-pointed, rich-glowing crimson blooms with a characteristic veining, its blooms erect on good stems and resisting disease successfully. Although considered by some to be perfumed, I have never detected any perfume of note. This lack of perfume is one of its faults. Had this rose the perfume of Etoile de Holland, I would consider it to be as near to the ideal as possible.

In concluding the discussion of red roses one must not omit our own Star of Queensland. True, it cannot aspire to exhibition honours, but it is a valuable garden rose, of a very dark-red colour, globular in form, and of mixed petalage, with good fragrance. It was introduced in 1909 by Mr. Williams, of Sunnybank, and, if my memory serves me correct, it is a cross from Earl of Dufferin and Etoile de France, and shares many of the characteristics of the latter parent. It is a good grower and disease resistant, and worthy of attention from growers situated under climatic conditions akin to those of Brisbane.

Whilst on this question of local hybridising, I might make mention of Mr. Williams' other success in Penelope. This is a well-known bicoloured rose, but is distinctly temperamental. It is an assured success in some quarters, and a rank failure in other parts. I can never subscribe to the opinion that it even ranks among our best twenty-four roses. This completes the review of the red roses, which I consider claim attention from the present standpoint. I place Etoile de Holland first, Hadley next, Lord Charlemont, Laurent Carle, equal for third place, and then Star of Queensland. Others not reviewed, but worthy of attention, are Hoosier Beauty, Mrs. Henry Winnett, Royal Red, and Sensation.

In dealing with pink roses, no dearth of good garden roses is experienced. I have discussed two already in the Radiance trio. There is no doubt that Radiance ranks very high in favour, and would probably secure premier position as the best pink garden rose. Probably next in favour would be J. J. L. Mock and Madam Abel Chatenay. The former is a rose grown by almost everybody, and probably no show passes without its appearing on the tables. Nevertheless, it is by no means an ideal exhibition variety, for it lacks form and finish. At times it opens into faultless blooms, but is usually inclined to be globular, with the edges of the petals curling over and hiding the centre. Again, it tends towards coarseness. In spite of these faults, and that of little perfume, it maintains a reputation based upon its freedom of bloom and the fine, upright carriage of the blooms on long, straight, solid stems, which are characteristic of the strong, upright growth. I have a tree of this variety 8 feet high but only 18 inches across. This very upright growth makes it possible to grow this variety close together. The fine dual toning of this rose is a conspicuous feature. Shell pink on the inside of the petals contrasts strikingly with solid imperial pink on the reverse. It is a remarkably good rose for internal decoration, as it lasts for a very long period of time. This accounts to a great extent for its popularity. A climbing form now in commerce appears to me, to be an extra strong form of the dwarf, and so far does not show vigorous climbing form in my garden.

Madam Abel Chatenay, a well-known salmon-pink rose, is a variety which inclines toward struggling growth and defoliation, but nevertheless it is a fine

garden rose. It carries an abundance of bloom, which, though not particularly good in form, possess an impelling attractiveness with their contrasting colours, silver on inside and deep salmon on the reverse.

Climbing Madam Abel Chatenay is perhaps the most valuable pink climber in vogue. It is always in bloom, and gives hundreds of large fine blooms identical with the dwarf. It is a strong grower, and needs plenty of room for development. I consider both the above roses should find a place in the best twelve. A little more difficulty is experienced when reviewing other pinks. That well-known rose, Columbia, always has a large following. Personally I have never had any very great success with the dwarf variety, though the more recent climbing form is a rose whose growth is difficult to control. The dwarf form is spoken of highly in many quarters, but it suffers from one very serious fault—the blooms are frequently crippled and open into small, misshapen flowers of no value. This is a serious drawback to an otherwise good variety. When good, Columbia is something to dwell upon. Under such conditions it is a faultlessly-shaped, high-pointed, richly-perfumed rose, of a glowing pink, rich and warm, which deepens with age. The blooms keep remarkably well, and the plant is very resistant to disease. This variety hails from the nursery of E. G. Hill, and was put into commerce in 1917. It is a rose that all should grow, for the beautiful flowers with which it rewards its grower at favourable seasons more than compensates for its occasional failures. Each year sports of this variety appear in commerce, among which are found New Columbia, Silver Columbia, Scott's Columbia, Mrs. Warren C. Harding, and Briarcliffe.

## KITCHEN GARDEN.

Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather get the ground ploughed or dug, and let it lie in the rough until required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. When the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

### RHUBARB.

The continued production of rhubarb may be greatly assisted by giving a heavy mulching of manure and hoeing it well into the soil. Keep the beds well watered, and give regularly a dressing of liquid manure, say, once a week.

It is not necessary to use forcing manures on the young stock, as plants are ruined if forced in the early stages of growth.

The rhubarb makes rapid growth during the autumn and spring, and when stalk cutting has been started liquid manuring and manuring may be given.

### LETTUCE CULTURE.

A thin sowing of lettuce seed where the plants are to mature insures not only an earlier crop, but it will be found that the plants grown in this manner are far less likely to run to seed than others transplanted from over-crowded seed-beds.

Lettuce resents checks in all stages of growth, and through inattention in the early stages many losses occur through early seeding. An undisturbed plant may be relied upon to give a good head at least a fortnight or more in advance of others, and for this reason alone it is worth while taking a little extra care in preparing the bed and sowing the seed.

A liberal dressing of manure is always beneficial to this crop, for, in addition to the food value, it retains moisture and keeps the roots cool during the hottest weather. Cow manure is the best, but whatever manure is used should be buried 9 inches below the surface. If it is put in deeper than this, the roots will not reach it until the plant is well developed, and therefore unable to take full advantage of the food provided. Unlike many more delicate plants, the roots of lettuce will penetrate rank manure even when quite small, and grow very rapidly.

Sow lettuce seeds in drills running from north to south. Draw them out with a blunt stick deep enough to allow a scattering of finely-sifted soil being placed in the bottom, and the seed being covered 1 inch deep. This will ensure an early and very even germination. When the seedlings are about 1 inch high, thin out to one plant to every 6 inches of the row. Frequent stirrings of the soil, and an occasional dusting of soot will induce rapid growth, and if, when the plants are half-grown, the surface of the bed is given a dressing of either nitrate of soda or sulphate of ammonia, at the rate of ½ oz. to each yard of row, and lightly forked into the ground, and afterwards well watered in through a fine-rosed can, the plants will readily respond. Good results will follow an application of liquid manure or even soot water.

## THE CARE OF THE LAWN.

For a lawn to be a success it must be carefully made in the first place. Good drainage is essential, for stagnant water-logged soil encourages weeds and kills the grass. The soil should be rich in plant food. Give the ground a heavy dressing of good manure, and thoroughly dig it over. Enough time should then be allowed for the soil to settle, as it must be firm when the grass is planted or there will be a series of hills and hollows shortly after. In addition to the manure apply the following mixture at the rate of 3 oz. to the square yard, forking or raking it well into the top spit of the soil:—2 lb. superphosphate of lime, 1 lb. bonemeal, and 1 lb. sulphate of ammonia.

Early in the spring, as the grass begins to grow, a heavy roller should be passed several times over the ground.

Lawns showing bare patches will require a dressing during the autumn, and the mixture previously mentioned will be found very suitable, and will keep the grass well nourished. Wood ashes and soot, combined or not, will also be found beneficial. All dressings should be applied during showery weather. If soil poverty is the cause of a patchy lawn, it is best to rake over in the autumn with a sharp-toothed rake, and dress with a good layer of fine soil and wood ashes.

## FLOWER GARDEN.

Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna lily, and other bulbs. Put away dahlia roots in some warm moist spot, where they will start gently and be ready for planting out in August and September.

# Farm Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Clean up all headlands of weeds and rubbish, and for this purpose nothing equals a good fire. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine—and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—i.e., when about one-third of the plants in the crop are in flower.

# Orchard Notes for July.

## THE COASTAL DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded; good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to insist on the observance of standards of quality and see that the fruit offered for sale complies with the standards prescribed, and that cases are marked accordingly.

Where the crop has been gathered, the trees may be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree. When the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer localities a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that may be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees may be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

The inclusion of a wide range of varieties in citrus orchards—and which has been the general practice—is to be deprecated. Even in new plantations there is a tendency to follow the same unprofitable lines. Far too much consideration is given to the vendor's description or the purchaser's appreciation of a particular variety or varieties. Individual tastes must be subordinated to market requirements, and the selection of varieties to the best available kind of early, medium, and late fruits. Amongst oranges Joppa should be placed first, Sabina for early fruit, and Valencia or Loon Giru Gong for late markets.

In mandarins local conditions influence several varieties, and since the introduction of the fungus known as "scab" the inclusion, particularly on volcanic soil, of the Glen Retreat and Emperor types is risky. In alluvial lands, Emperor and Sovereign (an improved Glen Retreat) are the most profitable, though Scarlet in many places is worth including, with King of Siam as a late fruit.

Land intended for bananas and pineapples may be got ready, and existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for Southern markets may be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from blackheart (the result of a cold winter) or from fruitlet core rot, they are good for canning, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing; well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before the spring growth starts.

In pruning, follow the advice given in the May number; and if you are not thoroughly conversant with the work, get the advice of one of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth and on spurs; but peaches and nectarines always on wood of the previous season's growth. Once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees may be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting may be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | June, 1929. | | July, 1929. | | MOONRISE. June, 1929. | MOONRISE. July 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | a.m. | a.m. |
| 1 | 6.39 | 5.0 | 6.47 | 5.5 | ... | 12.18 |
| 2 | 6.39 | 5 0 | 6.47 | 5.5 | 12.25 | 1.18 |
| 3 | 6.40 | 5.0 | 6.47 | 5.5 | 1.31 | 2.22 |
| 4 | 6.40 | 5.0 | 6.47 | 5.6 | 2.31 | 3.30 |
| 5 | 6.41 | 5.0 | 6.47 | 5.6 | 3.34 | 4.39 |
| 6 | 6.41 | 5.0 | 6.47 | 5.6 | 4.42 | 5.49 |
| 7 | 6.42 | 5.0 | 6 47 | 5.7 | 5.54 | 6.58 |
| 8 | 6.42 | 5.0 | 6.47 | 5.7 | 7.5 | 8.0 |
| 9 | 6.42 | 5.0 | 6.46 | 5.7 | 8.14 | 8 51 |
| 10 | 6.42 | 5.0 | 6.46 | 5.8 | 9 18 | 9 35 |
| 11 | 6.42 | 5.0 | 6.46 | 5.8 | 10.14 | 10.12 |
| 12 | 6.43 | 5.0 | 6 46 | 5.8 | 11.1 | 10.58 |
| 13 | 6.43 | 5.0 | 6.46 | 5.9 | 11.39 | 11.17 |
| | | | | | p.m. | |
| 14 | 6.43 | 5.0 | 6 46 | 5.9 | 12.13 | 11.47 |
| | | | | | | p.m. |
| 15 | 6.43 | 5.0 | 6.46 | 5.9 | 12.44 | 12.18 |
| 16 | 6.44 | 5.0 | 6.46 | 5.10 | 1.15 | 12.51 |
| 17 | 6.44 | 5.0 | 6 45 | 5 10 | 1.44 | 1.27 |
| 18 | 6.44 | 5.1 | 6 45 | 5.11 | 2.15 | 2.7 |
| 19 | 6.45 | 5.1 | 6 44 | 5.11 | 2.51 | 2.54 |
| 20 | 6.45 | 5.1 | 6.44 | 5.12 | 3.27 | 3.44 |
| 21 | 6.45 | 5.1 | 6.43 | 5.12 | 4.10 | 4.37 |
| 22 | 6.46 | 5.2 | 6.43 | 5.13 | 4.57 | 5.31 |
| 23 | 6.46 | 5.2 | 6.42 | 5.13 | 5.49 | 6.27 |
| 24 | 6.46 | 5.2 | 6.42 | 5.14 | 6.42 | 7.25 |
| 25 | 6.46 | 5.3 | 6.41 | 5.14 | 7.36 | 8.18 |
| 26 | 6.46 | 5.3 | 6.41 | 5.15 | 8.33 | 9.15 |
| 27 | 6.46 | 5.3 | 6.40 | 5.15 | 9.28 | 10.11 |
| 28 | 6.46 | 5.4 | 6.40 | 5.16 | 10.24 | 11.10 |
| 29 | 6.46 | 5.4 | 6.39 | 5.16 | 11.20 | ... |
| | | | | | a.m. | a.m. |
| 30 | 6.46 | 5.4 | 6.39 | 5.17 | 12.18 | 12.9 |
| 31 | | | 6.38 | 5.18 | | 1.14 |

## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|---|---|---|---|
| 7 June | ● New Moon | 11 56 | p.m. |
| 14 „ | ☾ First Quarter | 3 14 | p.m. |
| 22 „ | ○ Full Moon | 2 15 | p.m. |
| 30 „ | ☽ Last Quarter | 1 53 | p.m. |

Perigee, 8th June, at 1.30 p.m.
Apogee, 22nd June, at 10.54 p.m.

The occultation of Jupiter by the Moon about 5 hours after sunset will be invisible.

The planet Neptune, which has appeared to be remarkably close to Regulus, the brightest star in Leo, for some months past, will appear to be still closer on the 6th. The apparent distance between the planet and the star will very gradually increase after that date. On the 12th the Moon will pass 5 degrees below the planet and Regulus at 6 p.m., and, being still young, will permit the bright star to be noticed, thus forming a good indicator of that notable star's position.

The conjunction with the Moon of Jupiter on the 6th and of Mercury on the 7th will be invisible on account of their apparent nearness to the Sun. Mercury will pass about 3 degrees above the Sun from east to west on the 9th. Saturn will be in opposition to the Sun on the 18th, that is, it will rise as the Sun sets and set when the Sun rises.

The Australian winter solstice will occur on the 22nd when the Sun will reach its greatest northern latitude, the Tropic of Cancer, after which it will again slowly return southward.

Venus will be at its greatest elongation, 46 degrees west, on the 22nd. It will then be halfway between the eastern horizon and the zenith at the time of sunrise.

The principal constellations visible in June will be Leo, Virgo, Libra, Scorpio, and Sagittarius. Orion will set with the Sun on the 15th, while Scorpio will be hanging over the eastern horizon in double S-like curves, and at 11 p.m. will be immediately overhead at Brisbane, Toowoomba, and Warwick.

The Southern Cross on the 15th will be upright at 7 p.m., and in a horizontal position at 1 a.m., when it will be at its greatest distance (30 degrees) west of the south celestial pole.

| | | | |
|---|---|---|---|
| 7 July | ● New Moon | 6 47 | a.m. |
| 14 „ | ☾ First Quarter | 2 5 | a.m. |
| 22 „ | ○ Full Moon | 5 20 | p.m. |
| 29 „ | ☽ Last Quarter | 10 55 | a.m. |

Perigee, 6th July, at 11.0 p.m.
Apogee, 20th July, at 2·24 a.m.

Mercury, on the 3rd, is a morning star, apparently amongst those of Taurus, rising an hour and 48 minutes before the Sun, the nearest stars of any magnitude being Beta Tauri to the north-east and Aldebaran about the same distance to the west.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

*Supplement to the "Queensland Agricultural Journal," March, 1930.*

VOLUME XXXII

# QUEENSLAND AGRICULTURAL JOURNAL

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The Hon. the Secretary for Agriculture

Edited by J. F. F. REID

JULY to DECEMBER, 1929

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# QUEENSLAND AGRICULTURAL JOURNAL

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## Event and Comment.

### Organised Agriculture.

THE basis of any activity is intelligence. A survey of every problem and need is the first step in agricultural organisation. Formulation of a course of procedure based upon facts, experience, and sound reason follows. With these fundamentals recognised and given a place, initiative and freedom of action in the interests of those to be served are certain to yield results. The Department of Agriculture and Stock and our educational institutions, such as the Queensland University and the Queensland Agricultural High School and College, can and do render highly valuable assistance to the agricultural industry. They are very necessary agencies in the attainment of the objective of organised agriculture in Queensland. They are, moreover, the creation of all the people representing the common interests of all the people. To make our intelligence available, to free it from prejudice and petty and selfish considerations, and give it the impetus necessary for its practical application is one of the most important services we could render to the farming industry in any considered policy for its benefit. Forms and types of service will necessarily vary, but armed with intelligence based on careful survey and analyses and a well-planned programme, organised agriculture will no longer remain a voice crying in the night, with no other language than a cry. Loyal, well-informed leaders whose dominating ambition is to serve their fellow farmers are needed in all our organisations. Then must come co-ordination of farmers' groups whose interests may diverge to some extent, or otherwise become isolated. Those seeking to serve organised agriculture in a big and practical way have in the co-ordination of activities a very high service and a most important job.

## Higher Agricultural Education.

THE whole available forces of modern science and invention are also being brought into focus by the Department of Agriculture and Stock on field work and farming problems. Agricultural science has more than vindicated itself as directed by the Department in the results of experimental and demonstration work. All this work is continually producing valuable data for the practical farmer. Under its stimulation soil technicians are enabled to suggest improvement in cultivation methods and innovations in cropping systems; plant breeders are busy in plant study with the purpose of improving yield and disease and drought resistance; while pathologists and entomologists are working hard continuously on the eradication of diseases and pests.

In the Queensland Agricultural High School and College at Gatton we have also an institution that offers to farmers, sons of farmers, and those other young Queenslanders who look to the land for a useful career, specialised instruction of the highest standard and comparable with similar institutions established in the other States of the Commonwealth. The college is strongly and efficiently staffed, and the principal branches of practical agriculture are covered by a modern curriculum. It is believed that the function of higher agricultural education is not only to train students who will ultimately farm their own holdings, but also instructors, research workers, and the moulders of our agricultural future. With this object in view the courses at Gatton should develop still further the scientific side of agriculture, for the college has definitely taken its place as an auxiliary to the Queensland University.

## Economic Research.

QUEENSLAND with its vast area, its wide range of soils and climates, and its very small population, must for many years to come remain mainly a primary producing State. That being so, a sound agricultural developmental policy is absolutely essential if we are to secure economic stability. To that end, Departmental policy is being shaped—a policy advancing from stage to stage as the peculiar needs of any or every section of such a complex industry as agriculture become apparent. One of the most clamant needs of the day is scientific and economic research as applied to rural industry generally. The Commonwealth Statistician estimates the public and private wealth of Australia as approximately £3,000,000,000 sterling. The accumulation of such wealth by comparatively a handful of people in so brief a period of time constitutes an unparalleled achievement in the world's history. Most of this wealth has been derived from rural production; nor could it be otherwise in a vast virgin continent that was lying economically idle when first occupied by white people a little more than a century ago. The extent of the contribution of rural industries to the national wealth may be measured by the present yearly rate of rural production, which is approximately £280,000,000 sterling, or about £47 per head of population, or about £125 per head of rural population. The rural population represents 37 per cent. of the population of the Commonwealth, yet on recent figures it is responsible for about 61 per cent. of our total wealth production. Our city population represents 62 per cent. of the total population, but according to the same figures (Commonwealth Year Book) it is responsible for only 31 per cent. of our total production. Mining, forestry, and fisheries make up the balance. (Note.—These percentages are subject to modification, for it is recognised that manufactures, especially in Victoria and New South Wales, have increased remarkably both in output and value in the last couple of years, for which precise figures are unavailable.) The city population, of course, serves the community in other ways as well as in the production of manufactured goods; nor must the fact be lost sight of that the cities as industrial centres, constitute the farmers' best market—the home market. From the foregoing it may be deduced that of the two sections of the Australian population the rural is the richer, but is it? Exactly the opposite is the case. Therefore the need of effective and continuous research at once becomes evident if we are to find the depreciating factors or discover means by which we may improve our methods and the general economy of agriculture.

It should be one of the chief functions of any research bureau to lay bare the governing facts and factors in regard to the present position of agriculture in this State; to determine, for instance, the extent to which the primary producer can command a fair share of the wealth he produces, or the extent to which production costs and artificial economic conditions cut into his legitimate profits. In Australia we stand irrevocably for the maintenance of a living wage, and as a moral principle no one will dispute its justice. But to what extent does that principle hold good for the farmer, who not only puts into his business thought, time, and energy, but also much capital, generally every shilling he possesses? When we

talk of the market realisation of primary commodities not covering costs of production, we say, in effect, that had the producer of those commodities no other sources of livelihood or other resources on which he could draw, he would actually starve. How many farmers, it is fair to ask, collect less than the basic wage? That is what economic research must tell us, and how to remedy the well-known anomalies that exist on the economic side of agriculture.

## The Work of a Research Bureau.

SPEAKING on the importance of agricultural research at the opening of the Rockhampton Show last month, the Home Secretary (Mr. J. C. Peterson) surveyed the probable work of such a bureau, and the points he made may be summarised thusly:—

(1) To throw a spotlight on the Commonwealth Customs Tariff, examine it closely and suggest remedial measures, if advisable, for new and struggling rural industries.

(2) World's prices are, of course, beyond our control, but costs of production may not be. That is what we have got to find out.

(3) Like those engaged in other businesses, the farmer takes his produce to market, but, unlike them, he cannot balance costs of production by fixing his own prices, and must take what other business men offer him for his produce. He deals, too, in perishable and bulky goods. In the former case he must realise immediately or lose the lot; in the latter, he must pay for storage and costly handling. Then, again, the farmer is not usually a financier, and cannot afford to hold his produce for long. Economic research would show him the lowest price he could afford to accept for his produce; it would also help him by keeping him or his organisations well informed of market movements, of crop estimates, local and general, and in other similar ways.

(4) How often are costs of production in excess of the value of the produce raised and marketed? Is the farmer, who is not allowed to sweat his paid labour, often compelled to sweat his own family? Economic research would supply the answers and suggest the remedy.

(5) In secondary industry rising costs and every other conceivable charge are passed on. The farmer remains the economic shock absorber for the whole community. How we can lessen that economic shock is what we have got to find out.

(6) Ill-digestion of conflicting facts and half truths, when dealing with a sudden crisis in primary industry, is often followed by a temporary palliative which is often unfair to those immediately concerned as well as to the general taxpayer. Economic research, completely impartial and judicial in its outlook, would give timely warning of approaching or threatened crises and suggest means of preventing or avoiding them.

(7) Success of a crop or a section of primary industry in one district does not necessarily imply an equal success in other districts. Economic research would call attention to weaknesses of industries carried on in an unsuitable environment, and add strength to those more satisfactorily circumstanced, with the result that much wasted effort would be avoided and misdirected energy would, in the long run, give way to an all-round improved efficiency.

(8) Agriculture may be an art, but it is also a business in respect to which technical research cannot be separated from economic research.

(9) Many of our farms are over-capitalised, particularly in respect to modern machinery and plant which are often not fully and profitably employed. Economic research would keep the farmer informed on this phase of the industry.

(10) What are the prospects of success before the industrious farmer in regard to actual farming, and apart from a rise in land values or profits from speculative stock dealing? Economic research would give us some idea of the profits from actual production.

(11) To what extent can we absorb new settlers, migrants as well as native born, on our agricultural lands without disturbance of economic conditions, market, and otherwise? Continuous economic research would provide means of careful and accurate computation on this score.

How economic research should be conducted is, of course, a matter of determination by economists. The activities of a research bureau would extend to every section of primary industry, and it would materially add to the wealth of the State by indicating how methods and practices could be improved, how economic crises could be avoided, and how markets could be extended and stabilised.

# Bureau of Sugar Experiment Stations.

*The Bureau of Sugar Experiment Stations has received the following report (2nd May, 1929) from the Pathological Division of the Bureau:—*

## DOWNY MILDEW OR "LEAF STRIPE" DISEASE OF SUGARCANE.

Downy mildew or leaf stripe disease of sugar-cane is to be found in most parts of North Queensland wherever susceptible varieties are grown. The country in which the disease originated is not known with certainty, but it has been present in Queensland and Fiji for many years, and in the early days was called "Jump Up" by the kanakas. In 1909 it was found in Formosa, Japan, where it rapidly spread and caused a great deal of damage; and in 1920 it was introduced into the Philippines from Formosa, but prompt measures were taken and the disease was quickly eradicated. It is particularly destructive to the variety B. 208 in the Lower Burdekin, and B. 147 and Pompey in the Mossman district. In the Burdekin the disease has been responsible for the gradual disappearance of B. 208, but we think that with care this fine variety can be brought back again; certainly every effort should be made to accomplish this. The effects of the disease are a marked stunting of the cane and a low sugar content. On the Herbert River in 1910 diseased crops gave a p.o.c.s. of 10.7, as against the mill average of 13.8 for the same period.

### Appearance of the Disease.

The first sign of the disease in the young plant or ratoon crop is the appearance of yellowish-white stripes running lengthwise along the newly opened leaves. As the young leaf becomes older the stripes become yellow, then a mottled reddish-brown, and in the older leaves may be a uniform dark-red colour. The stripes are straight and regular and generally run the whole length of the leaf; they run parallel to the large veins of the leaf and remain the same width throughout the whole length. Typical stripes are about one-eighth of an inch wide and alternate with stripes of normal green leaf of about the same width. In many cases, however, the stripes are wider, and in some cases they run together, so that the whole leaf becomes yellow, and later a rusty red.

On the under surface of these yellowish stripes may be found a white, fluffy, "downy mildew." This is most abundant on the younger leaves and is best seen in the early morning, as it may be dried up by the hot midday sun. If a young diseased leaf is sprinkled with water and placed in a closed tin overnight a strong growth of the downy mildew will be found next morning. The leaf should not be kept more than one night, as after that time all sorts of unimportant molds begin to grow.

This stage of the disease may be found all through the year, but is most common in the warm, wet summer months.

In the winter months, especially in old ratoons and abandoned fields, a number of the diseased canes develop into freaks and grow abnormally long and thin. Some of these may be as much as two and a-half times the height of the surrounding cane, and they stand out like flags to indicate the presence of the disease. It was the presence of these very long canes which led the kanakas to apply the name of "Jump Up" to the disease. The leaves on these long canes are short and few in number, and later become shredded and twisted. The sticks are brittle and watery and low in sugar content. This stage is found only in old cane.

### The Cause of the Disease.

The disease is caused by a fungus known scientifically as *Sclerospora sacchari* T. Miy., which belongs to the class of fungi called the downy mildews. This fungus grows mainly inside the leaves and the yellowish stripes are formed as a result of its attack on the cells of the leaf. At night the fungus sends little stalks out through the breathing spores of the leaf, and on the ends of these are borne the spores or "seeds" of the fungus. A fresh crop of spores is produced every night and sometimes two or three crops. The spores are very delicate and tiny, being only about one-thousandth of an inch long, and dry up and die as soon as they are exposed to the sun. They are produced in extraordinarily large numbers and form the white downy mildew which is seen on the under surface of the leaves. A scientist, working with a very similar downy mildew disease of maize, estimated that on one diseased maize plant there were produced up to 4,000,000,000 spores in a single night. Since these spores are produced night after night, month after month, it will be understood that one diseased plant could provide enough spores to infect all the cane in the State.

### How the Disease is Spread.

As the spores of the fungus are so small and light, they are easily carried from diseased to healthy cane by the lightest of winds and air currents. The spores will only germinate in the presence of moisture, and so the disease spreads mainly during the wet season, when the cane is almost continuously wet. When a freshly-produced spore falls on to a moist surface it will germinate immediately, and if it happens to be lying on a suitable part of a cane plant it will penetrate the tissue, and the plant becomes infected with the disease. The spores may be carried great distances, but they quickly lose their power to germinate, and our experience is that they do not usually infect plants which are more than ten chains away from the diseased stool on which they were produced. (The Bureau is now carrying out experiments to determine exactly the distance over which infection takes place.) It has been found that the plant becomes infected mainly through the tender eyes. The younger eyes towards the top of the stalk are more susceptible than the older eyes toward the butt.

An experiment may be performed by taking some top cuttings of B. 208, or other susceptible varieties, stripping off the trash so as to expose the eyes, and laying them overnight beneath the leaves of a diseased stool. The sets are then planted, and it will be found that a large proportion will give rise to diseased plants as a result of the eyes having been infected by the falling spores.

Standing cane may become infected through the eyes, and yet the fungus may not travel up into the leaves, and thus the cane will appear quite healthy, but on being planted the infected eyes will give rise to diseased plants. It is therefore evident that a cane may appear quite healthy and yet have diseased eyes which will give rise to diseased plants. It is for this reason that cane within ten chains of a single diseased plant is not safe for seed.

### Methods of Control.

1. The first line of attack in this, as in most other diseases, is to plant healthy seed when planting susceptible varieties such as B. 208, B. 147, B. 156, and Pompey. It must be remembered that no cane within ten chains of even a single diseased stool can be considered healthy.

2. The young plant cane should be inspected frequently and any diseased stools pulled out and destroyed as soon as they are seen. This should be done during the dry winter months, when the spread of the disease is at a minimum—it is too late when rainy weather starts. It is very easy during the early cultivation to pick out the diseased plants and destroy them.

3. Burn trash immediately after cutting a field which contains some diseased cane.

4. Badly diseased cane should not be ratooned, but should be ploughed out immediately after cutting.

5. Do not have any volunteer ratoons or small patches of abandoned cane.

6. Plant resistant varieties if these precautions cannot be strictly observed.

Mr. George Wilson is at present in the Lower Burdekin district, and any farmer who wishes to plant B. 208 should get in touch with him. Mr. Wilson will give information as to the safest sources of seed, and if necessary will explain in detail the symptoms of the disease and its control. Mr. Wilson's address is Box 93, Post Office, Ayr.

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## DISEASE SURVEY OF THE GIRU DISTRICT.

A sugar-cane disease survey of the Giru district was carried out during the month of April, and revealed a very satisfactory state of affairs. Seventy-one farms were surveyed, and on fifty-nine of these no major diseases were found; downy mildew (leaf stripe) was found on five farms, and mosaic disease on seven farms. In each case the variety affected was B. 208, this variety being rather susceptible to both diseases. B. 208 is grown on some thirty-five farms. In order to protect the interests of the remaining farmers, orders to eradicate diseased plants were issued to the five farmers who had cane affected with downy mildew. The Bureau intends to see that these orders are carried out, and in this way it is hoped to make the district practically free from all major diseases. It must be emphasised that this very desirable freedom from disease can only be maintained if farmers continue to refrain from bringing in cane from other districts. It is by this means that all sugar-cane diseases are spread, and to introduce varieties from other parts of Queensland is taking a very grave risk. Farmers who desire any varieties which are not growing in their own district are requested to communicate with the Bureau of Sugar Experiment Stations for information as to the best source of that variety.

Any Giru farmer desiring information on downy mildew disease is referred to a circular which was recently issued from the Bureau and published in the Press. In this circular the appearance of the disease and the methods of spread and control were fully described, and it was particularly stated that no B. 208 taken from within a radius of ten chains of even a single diseased stool could be considered as safe seed. Any B. 208 block therefore should be carefully inspected for downy mildew before it can be considered as a source of seed.

The attention of farmers is directed to the fact that the small plantings of the variety P.O.J. 2714 have shown a very marked susceptibility to top rot, and therefore any plantings of this variety should be made with great caution in localities where top rot is prevalent.

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## GUMMING-FREE FARMS IN THE BUNDABERG DISTRICT.

The farms mentioned in the following list have been periodically inspected during the past year, and no trace of gumming disease has been found on any of the inspections:—

B. O. Smith, North Gooburrum (D. 1135).
W. J. Ferris, Ten-mile Road, Bingera (D. 1135, M. 189).
S. Nicolson, Maryborough Road (1900 S.).
F. G. Petterson, Pine Creek (D. 1135, 1900 S.).
O. Petterson, Pine Creek (1900 S.).
W. McGarry, Pine Creek (1900 S., D. 1135).
H. McGarry, Pine Creek (1900 S., D. 1135).
P. J. McGarry, Pine Creek (1900 S.).
E. J. Gaylard, Electra (H.Q. 285, D. 1135, 1900 S.).
H. Marles, Electra (H.Q. 285).
W. Hull, Yandaran (1900 S., D. 1135).
J. A. Knight, Yandaran (H.Q. 285, D. 1135, 1900 S.).
H. Buchback, Yandaran (H.Q. 285, D. 1135, 1900 S.).
J. Schmidt, Yandaran (D. 1135).
P. G. Maisey, Yandaran (H.Q. 285).
Batt and Dickson, Takoko (H.Q. 285, D. 1135, M. 189).
H. Neubecker, Waterloo, via Yandaran (H.Q. 285, D. 1135, 1900 S.).
R. Williamson, senr., Mullet Creek (1900 S.., M. 189).
F. C. Bugden, Mullet Creek (D. 1135).
G. Visona, Mullet Creek (H.Q. 285, D. 1135).
A. Hyland, Mullet Creek (Q. 855, 1900 S.).
H. Bugden, Mullet Creek (D. 1135).
R. Williamson, junr., Watalgan (H.Q. 285. H. 227, M. 189).
E. J. Grills, Watalgan (D. 1135, 1900 S.).
J. Grills, senr., Watalgan (H.Q. 285).
H. Richter, Watalgan (H.Q. 285, 1900 S.).
Bailey Bros., Miara, via Yandaran (H.Q. 285).

These farms are recommended as suitable sources of seed for the spring planting in so far as freedom from gumming disease is concerned. On some of the farms there is a small percentage of Mosaic, and care should be taken to prevent the cutting of stools affected with this disease. Naturally not every field of cane on these farms is suitable for seed purposes, on account of lack of vigour, &c., and purchasers should select their own seed as far as possible. It is, of course, possible that gumming disease may have been introduced into some of these farms since the last inspection, but this is not considered likely.

Some fifteen additional farms were found to be free from gumming disease, but have had to be abandoned for seed purposes on account of Mosaic disease, or the crops being badly grown.

### Suggestions for Owners of Farms Free from Gumming Disease.

The owner of a farm which is free from the destructive gumming disease will naturally desire to maintain this condition, and a study of the following points will assist him in this endeavour:—

1. Make yourself thoroughly acquainted with all the symptoms of gumming disease, particularly the early leaf streak symptoms. The field staff of this Bureau, or the officers at the Experiment Stations, will explain these symptoms, if desired.

2. Gumming is a highly infectious disease, caused by bacteria; the gum which oozes out from the cut ends of badly diseased canes consists of countless numbers of these extremely small germs.

3. The oozing of gum is almost the last stage of the disease. Every stick of cane in a field could be infected with gumming, and yet none of the sticks may have reached the oozing stage.

4. Cane must not be planted merely because it looks healthy; the selection of clean seed in a gumming area is very difficult and should be left to experts.

5. If your farm is clean, plant your own seed. If you desire to try out a new variety, write to the Director, Bureau of Sugar Experiment Stations, Brisbane, and find out if there is any guaranteed clean seed to be had. On no account plant cane from outside, no matter how healthy it looks, unless it has been O.K.'ed by the Director.

6. Gumming is spread from plant to plant in the field through the leaves, during wet, windy weather. The bacteria swim out through scratches in a diseased leaf, are brushed on to a healthy leaf, and enter through scratches in the healthy leaf. A single diseased plant will gradually infect the whole field.

7. Gumming may also be spread from plant to plant, and from field to field, by means of infected cane knives. A clot of gum was placed on a cane knife which was then thrown in a corner—six months later some of the bacteria were still alive and able to infect cane.

8. When selling plants, do not allow the purchaser to use his own cane knife, but see that he uses one of yours.

9. Do not allow men, animals, or implements from another farm to go into your cane during wet weather.

10. Do not allow chop chop from another farm to pass along your headlands, so that the leaves of the chop chop brush against your cane.

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## INSURANCE FOR THE MAN ON THE LAND.

### ESSENTIAL PROTECTIVE SERVICE.

The time has fortunately long since passed when it was necessary for the representative of the insurance office to first persuade his prospective client that insurance was sound business and not a form of gambling. There may be a few remaining still holding this latter erroneous view, but the man on the land of to-day as a rule is keen, businesslike, and fully seized with the necessity for the protection of his assets against loss through one of the many risks incidental to his calling, the happening of any of which might seriously cripple him financially. Insurance spreading among many the losses which otherwise would fall heavily on the few is scientific and prudent, and in affording relief against misfortune achieves the object for which it was brought into being.

The present is a progressively mechanical age, and the advent of the numerous modern machines, which tend to greatly lighten the labour of the primary producer also tend to increase in many ways the risk of fire and accident. The forms of insurance protection available at the present time as a result of this progress are much more numerous than was the case twenty years ago, and the necessity for insurance cover more urgent. While almost every farmer has for years past insured against fire his buildings he may now secure policies which will cover him against many other forms of loss. For example, wool is covered from the sheep's back until sold locally or overseas.

In respect of his legal liability for workers' compensation for accidents to his workmen arising out of or in the course of their employment full protection may be obtained, while for damage to persons or property as the result of the negligent driving of his motor-car, his tractor, or his other vehicles he may secure indemnity, including also the refund of his legal expenses in connection with the defence of any claims made on him in this connection. The insurance office of to-day is an economic necessity, and the prudent man on the land needs no convincing that the cost of his insurance premiums is a necessary working expense which secures for him essential protective service.

# FEEDING HABITS OF SOME QUEENSLAND BIRDS.

By HUBERT JARVIS, Entomological Branch.

The value of Queensland native birds and the importance of their protection have long been realised by many agriculturists and by those interested in ornithology. Many other members of the community, however, are less appreciative of the value of bird life, and it frequently becomes necessary to demonstrate to them the grounds on which the protection of birds is based. The decision to protect a species of bird on account of its economic status must be based upon an accurate knowledge of its feeding habits, and a valuable contribution to such knowledge can be obtained by an examination of its stomach contents. As a contribution to such a fund of knowledge, a number of the commoner Queensland birds were shot some years ago, and an examination was made of their stomach contents in the Department of Agriculture and Stock.

This work was initiated by the late Government Entomologist and Vegetable Pathologist (Mr. Henry Tryon), who identified the fifty-eight birds herein dealt with. The stomach contents in each case were determined by the writer during the years 1919 and 1920.

The birds were all collected in the Mount Gravatt area, near Brisbane, by Mr. Thomas Batchelor, whose skill as a taxidermist enabled him to mount for exhibition every bird shot, and the interesting collection thus made was acquired by the Department of Agriculture and Stock as a permanent exhibit.

After their determination the stomach contents were mounted on cards of uniform size, the fragments representing each group of insect being kept in separate areas. (Plate 1.) In many cases where an insect was found more or less complete it was possible to determine the family to which it belonged; but this was not always the case, as, frequently, the insect remains were broken into small fragments, making the identification of its systematic position impossible.

Each card was labelled with the name of the bird and a general description of the stomach contents, and the cards were arranged in exhibition cases, where they are now permanently on view in the Entomological Museum of the Department of Agriculture and Stock, Brisbane.

The information obtained as a result of these examinations has hitherto been available only to visitors to the Entomological Museum, and it has now been thought desirable to place it on record in the "Agricultural Journal," thus making it available to the agricultural community and to such sections of the scientific world as are interested in ornithological matters.

The nomenclature used in these notes is the one adopted in "The Official Check List of the Birds of Australia," and the numbers in brackets in this article refer to the consecutive numbers of the species in the check list mentioned.

It is now being realised by most orchardists that birds, destructive to the fruit crops during six or eight weeks in summer, may yet be doing useful work during the remainder of the year; and if this is the case even they are, therefore, worth protecting.

Few if any of Queensland's native birds are entirely destructive, and the value of by far the greater number to the agriculturist is now generally conceded.

Although it was found possible to examine comparatively few of the common birds, and in some cases only one of a species was procurable, the information obtained is, nevertheless, interesting, showing as it does how large a part of the dietary of nearly every bird examined was composed of insects.

1. (447) Australian Ground-Thrush (*Oreocincla lunulata* Latham) —Coleoptera, 1 Scarabæid, 1 Carab, 1 specimen undetermined; Hymenoptera, 1 ant; Hemiptera, 1 Asopid, 2 other specimens; Larvæ, 2 dipterous; fragments of vegetable matter.

2. (447) Australian Ground-Thrush (*Oreocincla lunulata* Latham) —Coleoptera, 2 Tenebrionids; Coleopterous larvæ, 3 wireworms; no seeds, fruit, &c.

3. (647) Australian Pipit (Ground Lark) (*Anthus* (*Austranthus*) *australis* Viellot)—Sow bug, cicadas, leaf hoppers; 6 small seeds.

4. (524) Australian Reed-Warbler (*Acrocephalus* (*Conopoderas*) *australis* Gould)—Cicadas, 3 beetles; no seeds, fruit, &c.

5. (179) Australian White Ibis (*Threskiornis molluccа* Cuvier)—Dragon fly larvæ, water bugs; no seeds, fruit, &c.

6. (428) Barred Cuckoo-Shrike (*Coracina* (*Paragraucalus*) *lineata* Swainson)—Beetles, dragon flies; small seeds.

7. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—2 crickets, 5 small Phasmids (stick insects), 3 spiders, 4 Coprid bettles, 1 small lizard; no seeds, fruit, &c.

8. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—1 cricket, 4 spiders, 1 Ichneumon, 1 Carabid beetle, 5 Coprid beetles, miscellaneous beetle fragments; no seeds, fruit, &c.

9. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—Grasshoppers, beetles; lantana seeds.

10. (705) Black-backed Magpie (*Gymnorhina tibicen* Latham)—Grasshopper, cicada, beetle fragments; no seeds, fruit, &c.

11. (373) Black-faced Flycatcher (*Monarcha melanopsis* Vieillot)—Coleoptera, 1 Clerid; Hymenoptera, large quantity of fragments; Diptera, fragments; Homoptera, 1 or more cicadas (small species); no seeds, fruit, &c.

12. (56) Dusky Moorhen (*Gallinula tenebrosa* Gould)—No insects; stones, vegetable matter.

13. (547) Dusky Wood-Swallow (*Artamus* (*Angroyan*) *cyanopterus* Latham)—5 beetles, 30 flies (miscellaneous); no seeds, fruit, &c.

14. (547) Dusky Wood-Swallow (*Artamus* (*Angroyan*) *cyanopterus* Latham)—20 caterpillars; no seeds, fruit, &c.

15. (318) Eastern Broad-billed Roller (Dollar-bird) (*Eurystomus orientalis* Linné)—3 cicadas, several beetles; no seeds, fruit, &c.

16. (318) Eastern Broad-billed Roller (Dollar-bird)—(*Eurystomus orientalis* Linné)—6 large cicadas; no seeds, fruit, &c.

17. (318) Eastern Broad-billed Roller (Dollar-bird) (*Eurystomus orientalis* Linné)—Large number of small beetles; no seeds, fruit, &c.

18. (318) Eastern Broad-billed Roller (Dollar-bird) (*Eurystomus orientalis* Linné)—40 small cicadas, 1 large bee, 12 beetles; no seeds, fruit, &c.

19. (421) Eastern Whipbird (*Psophodes olivaceus* Latham)—Cicadas, large number of fragments, 1 small lizard; no seeds, fruit, &c.

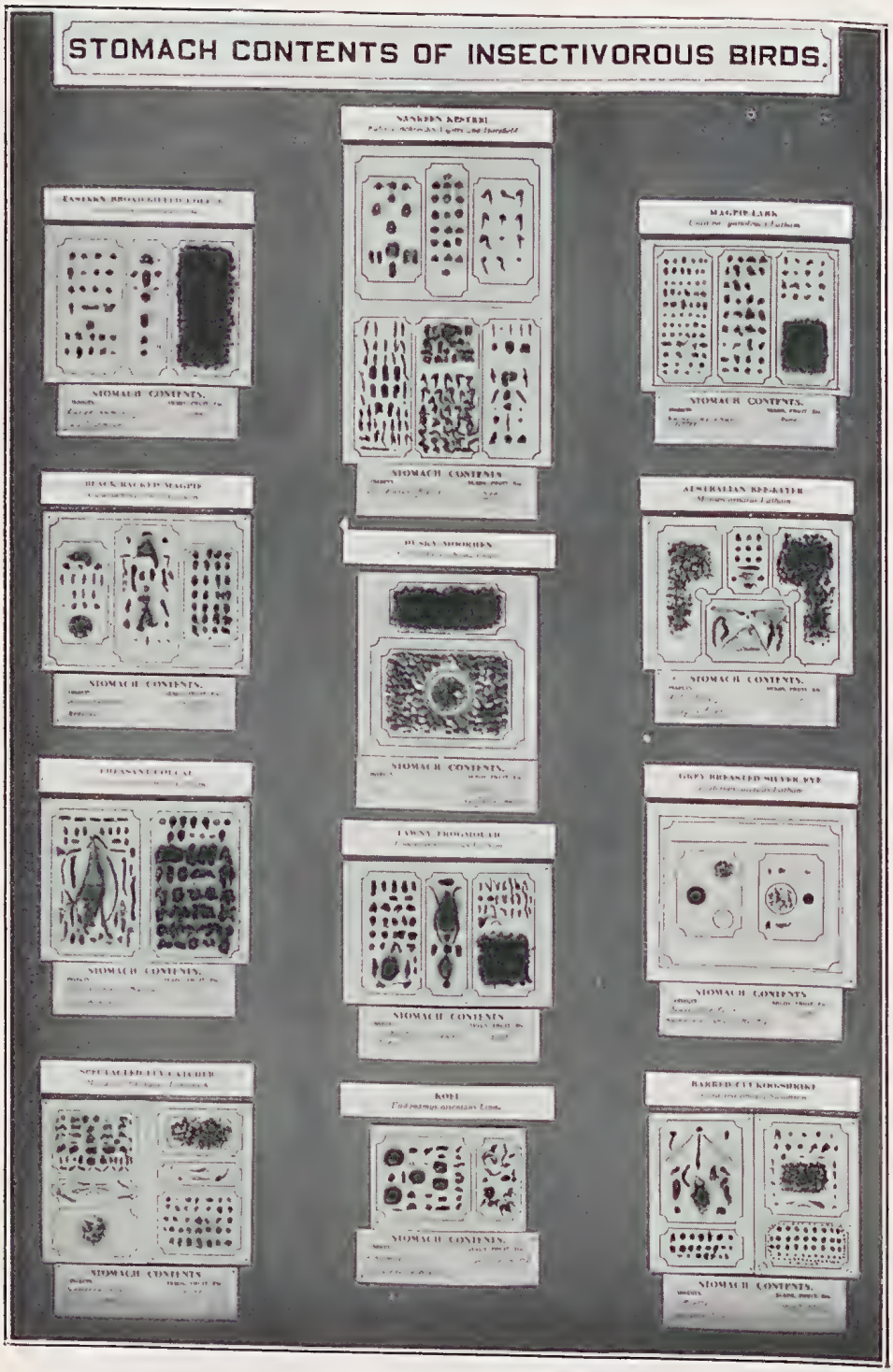
STOMACH CONTENTS OF INSECTIVOROUS BIRDS.
STOMACH CONTENTS.

PLATE I.

20. (324) Forest-Kingfisher (*Halcyon* (*Lazulena*) *macleayi* Jardine and Selby)—Dragon flies, large cockroach, ants; no seeds, fruit, &c.

21. (324) Forest-Kingfisher (*Halcyon* (*Lazulena*) *macleayi* Jardine and Selby)—2 grasshoppers, 1 cicada, 9 beetles; no seeds, fruit, &c.

22. (398) Golden Whistler (*Pachycephala pectoralis* Latham)—Coleoptera, 7 or more small beetles; Hymenoptera, ants, 1 Hymenopteron; Heteroptera, 1 plant bug; Larvæ, 4 or more Lepidopterous; no seeds, fruit, &c.

23. (676) Green Catbird (*Ailuroedus crassirostris* Paykull)—Coleoptera, 9 or more large Coprids; 9 large seeds, 3 small seeds.

24. (574) Grey-breasted Silvereye (*Zosterops lateralis* Latham)—Scale insects, numerous small beetles; no seeds, fruit, &c.

25. (361) Grey Fantail (*Rhipidura flabellifera* Gmelin)—1 grasshopper, 2 large spiders, 1 small lizard; no seeds, fruit, &c.

26. (429) Jardine Caterpillar-Eater (Cicada-bird) (*Endoliisoma* (*Metagraucalus*) *tenuirostre* Jardine)—2 large crickets, 4 small cicadas; no seeds, fruit, &c.

27. (429) Jardine Caterpillar-Eater (Cicada-bird) (*Endoliisoma* (*Metagraucalus*) *tenuirostre* Jardine)—Caterpillars, 26 or more (unidentified); 3 seeds.

28. (347) Koel (Cooee-bird) (*Eudynamys orientalis* Linné)—A number of plant-eating beetles; vegetable matter.

29. (322) Laughing Kookaburra (*Dacelo gigas* Boddaert)—1 cicada, 6 large ants, 2 spiders, 6 beetles (1 Clerid species, 1 Anoplognathus species, 4 plant-eaters Paropsis species); no seeds, fruit, &c.

30. (322) Laughing Kookaburra (*Dacelo gigas* Boddaert)—1 land crab; no seeds, fruit, &c.

31. (322) Laughing Kookaburra (*Dacelo gigas* Boddaert)—1 large grasshopper; no seeds, fruit, &c.

32. (415) Magpie-Lark (*Grallina cyanoleuca* Latham)—39 ants, 8 beetles, leaf hoppers; small seeds.

33. (415) Magpie-Lark (*Grallina cyanoleuca* Latham)—Numerous small beetles; no seeds, fruit, &c.

34. (415) Magpie-Lark (*Grallina cyanoleuca* Latham)—40 small beetles, large number of ants; no seeds, fruit, &c.

35. (240) Nankeen Kestrel (*Falco* (*Cerchneis*) *cenchroides* Vigors and Horsfield)—24 large beetles; no seeds, fruit, &c.

36. (645) Noisy Friar-bird (*Philemon* (*Tropidorhynchus*) *corniculatus* Latham)—Beetles (root-eating); no seeds, fruit, &c.

37. (352) Noisy Pitta (*Pitta* (*Coloburis*) *versicolor* Swainson)—Coleoptera, 8 Coprids, 4 weevils (3 species); no seeds, fruit, &c.

38. (352) Noisy Pitta (*Pitta* (*Coloburis*) *versicolor* Swainson)—Coleoptera, 3 large Scarabæids, 12 or more Coprids; 1 Japyx; no seeds, fruit, &c.

39. (686) Paradise Rifle-bird (*Ptiloris paradiseus* Swainson)—Coleoptera, 1 Chalcopterus species, 1 Tenebrionid, 2 large beetles; Hymenoptera, 36 small ants, 3 large specimens; Larvæ, 1 Coleopterous; fragments of wood; 3 seeds (accidental?).

40. (686) Paradise Rifle-bird (*Ptiloris paradiseus* Swainson)—Coleoptera, 3 Tenebrionids; Orthoptera, 2 crickets, 1 small cockroach;

Hymenoptera, 4 or more ants (undetermined); Spiders, 2 or more; Larvæ, 1 large Cerambycid (wood borer); no seeds, fruit, &c.

41. (686) Paradise Rifle-bird (*Ptiloris paradiseus* (Swainson)—Coleoptera, 3 or more Tenebrionids (Chalcopterus); Lepidoptera, 10 larvæ, 5 pupæ; Hymenoptera, 1 wasp; no seeds, fruit, &c.

42. (349) Pheasant-Coucal (*Centropus* (*Polophilus*) *phasianinus* Latham)—Stick insects (Phasmids), grasshoppers; seeds.

43. (349) Pheasant-Coucal (*Centropus* (*Polophilus*) *phasianinus* Latham)—Very large caterpillar, 4 plant-eating beetles; small seeds.

44. (700) Pied Butcher-bird (*Cracticus nigrogularis* Gould)—Heteroptera, 9 water bugs; fragments; no seeds, fruit, &c.

45. (700) Pied Butcher-bird (*Cracticus nigrogularis* Gould)—5 dragon flies, 2 large grasshoppers; no seeds, fruit, &c.

46. (694) Pied Currawong (Bell-Magpie) (*Strepera graculina* Shaw)—Coleoptera, 2 Coprids (large), 1 Coprid (small); Hymenoptera, 2 ants, 1 Ichneumon; Mollusca, 1 snail; small quantity of vegetable matter.

47. (329) Rainbow-bird or Australian Bee-Eater (*Merops* (*Cosmaerops*) *ornatus* Latham)—Ants, flies, dragon flies; no seeds, fruit, &c.

48. (684) Regent Bower-bird (*Sericulus chrysocephalus* Lewin)—Coleoptera, 1 beetle; Orthoptera, 1 grasshopper; Hymenoptera, 1 ant (head only); Dermaptera, 1 earwig; seeds and fragments of vegetable matter.

49. (679) Satin Bower-bird (*Ptilonorhynchus violaceus* Vieillot)—Coleoptera, 3 plant-eating beetles (*Phyllocharis cyaniformis*); native fruit.

50. (679) Satin Bower-bird (*Ptilonorhynchus violaceus* Vieillot)—No insects; lantana seeds, fruit skins.

51. (392) Southern Yellow Robin (*Eopsaltria australis* Shaw)—Lepidoptera, 1 small pupa; Hemiptera, 1 black bug (Aednus species), 2 small Lygaeids; Hymenoptera, 1 Ichneumon, 3 ants; 1 spider; no seeds, fruit, &c.

52. (673) Spangled Drongo (*Chibia* (*Notochibia*) *bracteata* Gould)—1 bug, 15 wasps, 7 plant-eating beetles; no seeds, fruit, &c.

53. (673) Spangled Drongo (*Chibia* (*Notochibia*) *bracteata* Gould)—Coleoptera, bark beetle (Chalcopterus species); Dynastid species; Homoptera, small cicada (Pauropsalta species); no seeds, fruit, &c.

54. (375) Spectacled Fly-Catcher (*Monarcha* (*Symposiachrus*) *trivirgata* Temminck)—Numerous flies and small beetles; no seeds, fruit, &c.

55. (565) Spotted Pardalote (*Pardalotus punctatus* Shaw)—Leaf hoppers, 30 ants; no seeds, fruit, &c.

56. (313) Tawny Frogmouth (*Podargus strigoides* Latham)—7 beetles, cicadas, bugs; no seeds, fruit, &c.

57. (313) Tawny Frogmouth (*Podargus strigoides* Latham)—30 large beetles, 1 mole cricket, 3 large ants; no seeds, fruit, &c.

58. (536) Variegated Wren (*Malurus* (*Leggeornis*) *lamberti* Vigors and Horsfield)—Hymenoptera, 7 or more ants; Hemiptera, 22 plant bugs (Nysius species); 1 spider; no seeds, fruit, &c.

# PESTS OF DECIDUOUS FRUITS.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

The following insects are dealt with in these notes:—Queensland fruit fly, codling moth, woolly apple aphis, and San José scale.

## The Queensland Fruit Fly.

The Queensland fruit fly (*Chætodacus tryoni* Froggatt) is rightly regarded as being worthy of inclusion in the category of highly destructive insects. Records of its occurrence were obtained in the early days of fruit-growing in this State, and for almost forty years it has been a subject of great interest to both fruit-growers and scientific investigators. It has frequently been stated that the Queensland fruit fly is identical with an Indian species, *Dacus ferrugineus* F., but local opinion favours the belief that the fly now under discussion is a native of this country and is not the Indian species referred to. The Queensland fruit fly is not confined to this State, for many records of its occurrence have been obtained in the neighbouring State of New South Wales.

### Detailed Investigations.

The following paragraphs contain a brief account of what is at present known with respect to the life history and control of the Queensland fruit fly. The pest was studied by Henry Tryon many years ago, and more recently it has been the subject of a detailed investigation by Hubert Jarvis, the Departmental Entomologist stationed in the Stanthorpe district. Tryon's early reports have long been out of print, but that is not the case with respect to those prepared by Jarvis, and readers who desire fuller details with respect to this pest should accordingly consult the various progress reports published by Jarvis. The Queensland fruit fly has also been extensively studied by F. A. Perkins, who was located at Stanthorpe for several years as Stanthorpe Research Fellow, working in association with the University of Queensland. A number of progress reports by the latter investigator have appeared in the local press.

### Nature of Injury.

The larva or maggot is the life-cycle stage in which this insect damages fruit. The larva feeds voraciously and tunnels throughout the fruit in any direction, and not only does it destroy much tissue in doing so, but its presence also leads to the rotting of the attacked fruit, which is rendered valueless for marketing.

### Fruits Attacked.

The fact that the Queensland fruit fly has been a pest of outstanding importance of deciduous fruits grown in the Stanthorpe district has sometimes somewhat obscured the additional fact that it is a species that attacks a wide range of cultivated fruits other than those produced at Stanthorpe.

It has been recorded as attacking the following fruits:—Apple, apricot, banana, cape gooseberry, cherry, custard apple, date, fig, granadilla, grape, grape fruit, loquat, mandarin, mango, nectarine, passion

*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

fruit, papaw, orange, peach, pear, persimmon, plum, quince, tomato, and walnut. It has also been bred from quite a number of other fruits, including those of certain native trees.

The Queensland fruit fly attacks bananas in the Southern banana districts, but in the North the fruit fly losses in bananas are due to the presence of another species, namely *Chætodacus musæ* Tryon.

It is rather a curious fact that the notorious Mediterranean fruit fly (*Ceratitis capitata* Wied.) does not occur in this State, although it is a very common species in the neighbouring State of New South Wales.

## Life Cycle Stages.

The egg (Plate 2, fig. 1) of the Queensland fruit fly is creamy white in colour and is distinctly elongate. It is slightly curved and tapers at both ends, measuring roughly about $\frac{1}{25}$ inch in length. It might quite appropriately be described as being somewhat banana-shaped.

The larva (Plate 2, fig. 2) is creamy white in colour and measures about $\frac{1}{3}$ inch in length when full-grown. It is bluntly rounded off at the anal end but it tapers off to a fine point at the head end. It is legless but is nevertheless capable of moving over a surface when removed from the fruit, and it is, further, capable of jumping quite appreciable distances.

The pupa is formed within a somewhat hard-shelled yellowish-brown or reddish-brown cylinder, known as the puparium (Plate 2, fig. 3). The puparium is bluntly rounded off at either end and is about $\frac{1}{6}$ inch in length.

The adult (Plate 2, fig. 4) is a rather prettily marked fly, of a somewhat reddish-brown colour broken by numerous conspicuous lemon-yellow spots or lines on the thoracic segments. In the female there is an ovipositor or egg-laying tube at the apex of the abdomen (Plate 2, fig. 4); in the male the abdomen has a distinct fringe of bristles on each side (Plate 2, fig. 5). The single pair of wings is clear or hyaline, except for certain areas which are quite distinctly coloured as indicated in the accompanying plate. The fly is about $\frac{1}{3}$ inch in length with a wing-spread of about $\frac{2}{3}$ inch.

## Life History.

The female fly, when ready for egg-laying, selects a suitable fruit in the skin of which she makes a slight puncture, and then inserts a number of eggs in the underlying tissue. The site chosen for oviposition by the fly can be detected by the presence of the puncture which, in the case of certain fruits, exudes a small quantity of gum. It is generally agreed that six or seven eggs may be laid when each puncture is made, but a more difficult point is to accurately determine the total egg-laying capacity of each individual. That has not been ascertained, but dissections of Stanthorpe flies have disclosed the presence of some fifty or sixty eggs in the ovaries.

The eggs undergo the usual incubation transformation, and the larvæ hatch out in two or three days in the warm summer months. They then feed on the tissue of the fruit, thus producing the damage and losses already described. The maggot grows rapidly in the height of summer, when it is feeding under favourable conditions, and after passing through a series of moults it becomes full-grown in six or seven days. In colder weather, however, this stage of the life cycle is much prolonged.

Fig. 1.
Eggs x 10.

Fig. 3.
Puparium x 5.

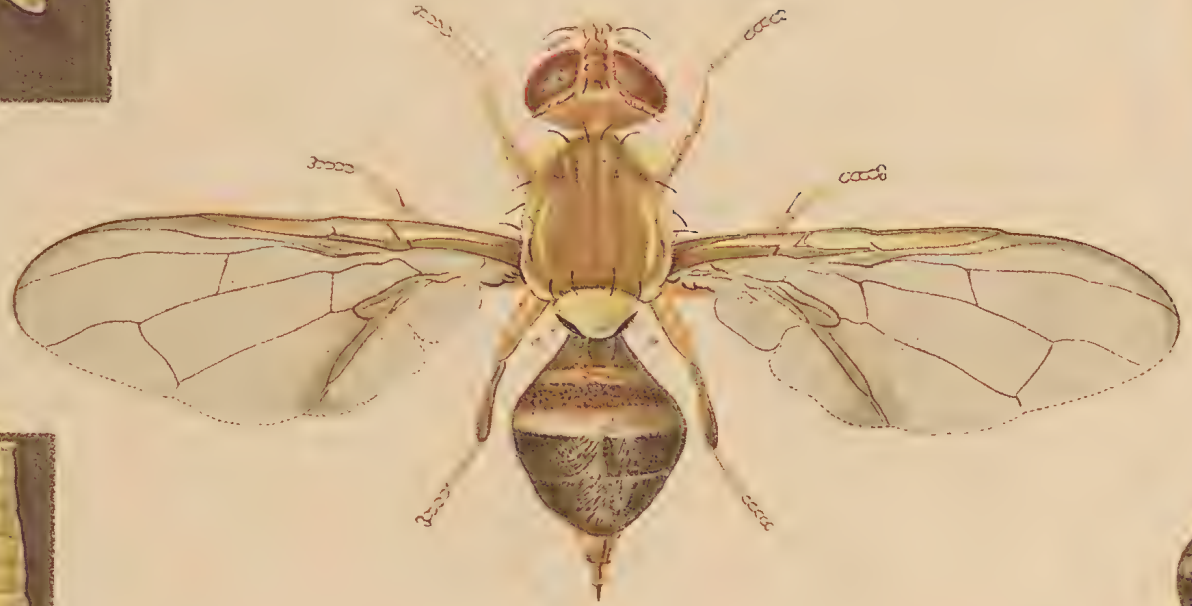

Fig. 4.
Adult x 10.

Fig. 2.
Larva x 5

Fig. 5.
Male Abdomen x 10

When the larvæ are full-grown they leave the fruit and burrow into the soil for the purpose of pupating. The pupæ are formed at varying depths, which depend on a variety of factors, including the nature of the soil. They may be found just covered by the soil or they may be located at a depth of several inches, although they are rarely found at a greater depth than 2 inches. As already mentioned, the pupæ are formed within reddish-brown or dark-brown cylindrical puparia. The pupal period may be as short as one week in the height of summer, or it may be very greatly prolonged in the colder months. In fact, the fly has been proved to overwinter in small numbers as pupæ in the Stanthorpe district.

At the end of the pupal period the flies emerge, feed, mate, and lay eggs, and thus the next generation is produced.

## Natural Enemies.

A number of parasites have been bred from the Queensland fruit fly, the best known of which is the Braconid wasp *Opius tryoni* Cameron. In some seasons this parasite is particularly active in attacking the fruit-fly maggots in native fruits, and it has also been bred from fly-infested cultivated fruits.

Certain predatory insects also assist the parasites in maintaining a partial control over this pest. The degree of biological control exercised by these native enemies is, however, only relatively slight, and hence the orchardist must resort to artificial control measures to check the ravages of this pest and to supplement the efforts of the parasitic and predatory enemies.

## Control Measures.

The preceding brief outline of the life history of the Queensland fruit fly should clearly indicate the possibility of the successful adoption of certain measures of control. Outstandingly important in the campaign against this pest is the collection and destruction of infested fruit. This measure has been consistently advocated ever since the attention of investigators was first directed to the problem some forty years ago, and it should still be retained as an extremely important means of combating the fruit fly.

Orchard hygiene should therefore be the first line of attack against this pest, and infested fruit should be regularly collected and destroyed. To facilitate the picking up of infested fruit that has fallen to the ground, the orchard should be kept as free from weeds as is practicable. If the orchard is overgrown, then efficient picking up will be a matter of considerable difficulty, and much infested fallen fruit will be overlooked, and the maggots contained therein will leave the fruit, pupate in the soil, and produce a fresh brood of flies.

When the infested fruit has been collected, the question of the best means whereby it may be disposed of automatically arises; the orchardist has the choice of several means of dealing with that fruit, and each of these is quite satisfactory, if properly practised.

One at least is, however, open to serious objection if carelessly carried out, and indeed, when proper precautions are not observed, the labour expended on the collection of the fruit is rendered quite valueless. Here reference is made to the burying of the infested fruit.

Boiling infested fruit that has been picked up is a very effective means of disposal, and is one that is in general favour. Burning the stung fruit in a good hot fire can also be practised, and, as already mentioned, the burying of picked-up fruit is an alternative means of disposal. When the latter practice is followed, every precaution must, however, be taken to ensure that the fruit is buried deeply, i.e., with a soil covering of about 18 inches. If the stung fruit is but slightly covered with soil, no good will have been accomplished by its collection, for large numbers of flies can emerge from infested fruit that has been buried in a shallow trench.

The next control measure to which reference must be made is the reduction of the adult fly population by means of luring. A lure and suitable glass traps are now on the market; where these are employed in an orchard they should be placed on boards in leafy trees and then baited with the fruit-fly lure. It is essential that the traps be placed in the orchard early in the season, and that they receive regular attention for such purposes as the renewal of the lure.

A further control measure of value is the elimination of all useless fruit-trees or other plants that may serve to harbour the fly and to act as a source of infestation in which flies will be bred to attack and destroy the cultivated fruits on which the orchardist is making his living.

The possibility of controlling the Queensland fruit fly by the use of both repellents and poison sprays has not infrequently been a subject of inquiry, but, so far as the entomological branch of this department is concerned, it possesses no definite evidence to show that these measures can as yet be recommended as being both practicable and effective. They are, however, worthy of some further attention, but in the meantime efforts at control should be concentrated on the measures already recommended.

Firstly, collect and destroy infested fruit; secondly, trap the adult fly; and thirdly, eliminate worthless, non-commercial fruit-trees.

## The Codling Moth.

The codling moth (*Cydia pomonella* Linn.) is without doubt one of the most serious pests of the apple in Queensland, and the losses due to its destructive activities are surpassed only by those inflicted by the Queensland fruit fly. Elsewhere the codling moth is generally regarded as the worst insect pest known to the apple-grower.

It is believed that this pest is a native of South-eastern Europe, whence it has spread to every other continent, and it is safe to say that there are few districts in which apples are grown that are not now thoroughly infested. The Stanthorpe district of Queensland is unfortunately included in the infested areas. It is somewhat difficult to say just when the codling moth reached Queensland, but records show that infested fruit was observed in Brisbane in 1889. Much earlier references to this pest are available in the Southern States, and a severe infestation was recorded in Tasmania as far back as 1857.

The word "codling" is, in the opinion of some investigators, merely a corruption of the old English word "querdlying," a term that was employed to signify a half-grown or immature apple. It has also been employed in more recent years to designate a number of varieties of cooking apples.

The "wormy" apples produced by the feeding of the codling moth larvæ have been referred to in European publications for centuries, and a reference to "wormy apples" occurs even as early as 200 B.C. in Cato's treatise on agriculture.

The codling moth belongs to the family Tortricidæ in the order Lepidoptera, and is very closely allied to several species that also live in fruits and seeds, e.g. the nut fruit tortrix (*Carpocapsa splendidana* Hb.), which attacks the fruits of Spanish chestnuts in Europe.

### Nature of Injury.

The injury, as is the case with practically all species of destructive moths, is inflicted in the immature stage known as the larva or caterpillar, the moth itself being quite incapable of attacking the fruit. The larva, on hatching from the egg laid by the moth, enters the fruit and eats its way through the flesh to the core. There it continues feeding, and in doing so it scoops out an irregular cavity and also feeds on the pips. Much of the attacked fruit falls to the ground while still small and green, and is obviously quite unmarketable.

### Fruits Attacked.

The apple is pre-eminently the fruit that is severely attacked by the codling moth, although very appreciable losses may also occur in pears, quinces, and walnuts. The peach, nectarine, plum, apricot, and cherry have also been recorded as host fruits of this pest.

### Life Cycle Stages.

The egg (Plate 3, fig. 1) of the codling moth is somewhat oval in outline, and is about the size of a small pin's head. It is a very thin, semi-transparent object, and has been rather aptly described as resembling a fish-scale. When just laid the egg is pearly white in colour, but as the incubation period advances a red ring develops which tends to give it a darker appearance. An examination with a hand lens will show that its surface, particularly round the flange, possesses a beautifully sculptured network of ridges.

The larva (Plate 3, fig. 2), when full-grown, is about $\frac{3}{4}$ inch in length, and is pinkish or whitish in colour, with a brown head and a number of scattered hairs on the body. It possesses eight pairs of legs, three of these being jointed legs situated on the thoracic segments, while the remaining five pairs are fleshy unjointed legs situated on the abdominal segments.

The pupa or chrysalis (Plate 3, fig. 4) is brown in colour, and measures about $\frac{1}{2}$ inch in length. The head, eyes, antennæ, and legs of the future moth can be distinctly seen in the pupa.

The moth (Plate 3, figs. 5, 6) measures about $\frac{3}{4}$ inch when its wings are spread out (as in fig. 5 of Plate 3). The front wings are grey in colour, but the uniformity thereof is broken by a number of irregular darker transverse lines, and is further modified by a patch of beautiful copper-coloured scales of a metallic tint. The hind wings are a plain greyish-brown colour.

### Life History.

The codling moth passes through the winter months as a larva in a tough silken cocoon (Plate 3, fig. 3), and the stock of codling moth

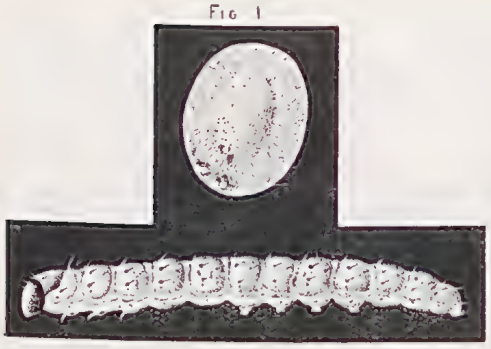

FIG 1

FIG 2

FIG 4

FIG 5

FIG 6

FIG 3

FIG 7

PLATE 3.—THE CODLING MOTH (*Cydia pomonella* Linnæus).

Fig. 1.—Egg of codling moth × 15.
Fig. 2.—Larva × 4.
Fig. 3.—Larva and pupa in silken cocoons × 2.
Fig. 4.—Pupa × 4.
Fig. 5.—Moth or imago with wings spread × 5.
Fig. 6.—Moth or imago with wings folded × 5.
Fig. 7.—Correct time for first spray.

available for starting the infestation each season on the orchard consists of such larvæ as have survived the winter in safe situations.

At the approach of spring these overwintering larvæ transform to pupæ, and in the pupal stage profound reorganisation takes place, as a result of which the moths emerge after a pupal period of about three or four weeks under average conditions.

Many of the moths developed from the overwintering larvæ emerge a few days after the petals have commenced falling from the apple blossoms, and after mating they proceed to lay their eggs. These are laid mainly on the leaves in the case of the spring brood moths at present under consideration, and after an incubation period of about ten days the young larvæ hatch out.

The young larvæ may feed for a short period on the young foliage, but they generally make for the fruit and enter it usually at the calyx or flower end in the case of this first generation. In the later generations, however, many of the larvæ enter at the side of the fruit, particularly where two fruits touch. The larvæ having entered the fruit then work their way to the core, and feed as already indicated in an earlier paragraph. The larvæ of the first generation are generally full-fed in slightly less than four weeks, at the end of which period they leave the fruit and go in search of a suitable spot in which to pupate.

The pupæ are found under pieces of loose rough bark or in cavities or cracks in the limbs of the tree; pupation may also take place under clods of earth at the base of the tree, and in fact in many other situations. The duration of the pupal stage in the first generation, like that of all other life-cycle stages, varies appreciably, but it is generally about twelve or thirteen days, which is very much shorter than in the case of the pupæ formed by the overwintering larvæ.

At the end of the pupal stage the moths emerge, feed, and mate, and in three or four days after mating the females start egg-laying, thus commencing the next or second generation.

There is usually only one brood of codling moth each year in England and in Northern Europe, but in Queensland two generations occur regularly, and a third is quite possible.

## Control Measures.

The following control measures are available for combating this pest:—

(1) Spraying with arsenate of lead;
(2) Bandaging of trees;
(3) Destruction of windfalls;
(4) Cleaning up packing sheds;
(5) Cleaning bark of infested trees;
(6) Judicious thinning of heavy crops.

While each of these control measures is undoubtedly productive of much good, no one of them will alone give thoroughly effective control. It is therefore strongly recommended that all six measures be enforced, and if that is done there is every reason to believe that in a normal season losses will be reduced to relatively small proportions.

Spraying with arsenate of lead must be repeated several times, and the first spray should be applied as soon as the petals have fallen and

before the calyx-cup has closed. The lobes or sepals of the calyx are wide apart for about a fortnight after the fall of the petals, and a spray applied before these lobes close up coats the calyx-cup with the poison. As already mentioned in the discussion of the life history of this pest, the great majority of the larvæ of the first generation enter at the calyx end of the fruit, and in doing so they are poisoned by the arsenate of lead which they swallow when eating their way in at the calyx. The correct time at which to apply the calyx spray is indicated in fig. 7 of Plate 3.

The mortality among the young larvæ is by no means exclusively caused by their attempting to enter at the poisoned calyx, for observations have shown that many perish before reaching that portion of the fruit. Earlier remarks indicated that many of these larvæ feed for a brief period on the tissue of the leaves on which they hatch out, and in doing so they will in many cases swallow fatal doses of the arsenate of lead with which the foliage is coated.

The calyx spray is of great importance in the control of this pest, and it should invariably be applied. It must, however, be succeeded by several cover sprays at intervals of two or three weeks, the object of these sprays being to coat the growing apple with poison.

The strength at which the arsenate of lead is applied varies to some extent, some investigators recommending 1 lb. of the powder arsenate of lead to 50 gallons of water, or 2 lb. of the paste arsenate of lead to a similar quantity of water. Other workers recommend sprays that are 50 per cent. stronger—i.e., 1½ lb. of powder arsenate of lead to 50 gallons of water. The weaker strength is that at present recommended in Queensland.

No matter how carefully spraying may have been attended to, an appreciable proportion of young codling moth larvæ will escape poisoning, and hence spraying must be supplemented by other control measures.

The bandaging of trees is one of these important supplementary control measures, and its adoption is definitely recommended. It will be found that many of the larvæ, on leaving the fruit to locate suitable spots for pupation, assemble under the bands, and if these are periodically examined at intervals of a week the insects found thereunder can be destroyed. The success of this control measure will largely depend on the trees having previously been cleaned of cover under which the larvæ might otherwise wish to pupate, e.g. under pieces of loose bark. The bandages can be made from a piece of strong cloth 10 inches wide, which is folded to form a double band 5 inches wide, and is then bound tightly round the tree and held in position by a nail. It is recommended that in the Stanthorpe district bandages be in place on the trees at the end of October.

The destruction of windfalls is another important measure of value in reducing codling moth infestation. If windfalls attacked by codling moth larvæ are allowed to remain on the ground, many of the larvæ contained therein will survive and complete their development, thus still further intensifying the infestation.

The cleaning up of packing sheds is a valuable precaution that should not be overlooked, because many of the larvæ in infested fruit leave the fruit when in the packing sheds and select suitable crevices in which to spin their cocoons and overwinter. The flooring boards,

packing benches, and empty cases should therefore be carefully inspected, and, if necessary, treated with boiling water in an endeavour to kill any larvæ that may have taken shelter therein.

Mention has already been made of the fact that, in bandaging, success will be most marked when the banded trees are thoroughly cleaned up, so as to eliminate shelter spots to which the larvæ may go for pupation in preference to assembling under the bands. For this reason it is highly desirable to close up any cavities or cracks that may occur on the branches or main stem of the trees, and also to scrape off any loose bark that may be present. For the former purpose sticky clay or putty is satisfactory, and for the latter any suitable blunt instrument may be used.

Finally some reference must be made to the fact that the thinning of fruit, where a heavy crop of apples has set, is of some material advantage so far as codling moth control is concerned. A judiciously thinned crop can be sprayed in a much more satisfactory manner than one that has not been so treated.

Prominence has recently been given to the trapping of the moths themselves in glass containers baited with suitable attractants. This possible method of control was tested fairly extensively during the 1926-27 season in the Stanthorpe district, but the results obtained, under the conditions then prevailing in that district, were very disappointing, and trapping of the moths cannot be added to the list of control measures.

Reference must also be made to the present attempt to establish some measure of biological control. This originated in September 1927, when a colony of a very small wasp, *Trichogramma minutum* Riley, was received from California. This beneficial insect attacks the eggs of the codling moth, and when Mr. Ranger, manager of the Committee of Direction of Fruit Marketing, was in North America last year he saw the handling of this parasite by Mr. Flanders, the entomologist of the Walnut Growers' Association. Mr. Ranger was much impressed by that work, and accordingly arrangements were made to forward a colony of the parasite to Queensland. It has since been bred in Brisbane and liberated in the orchards. This is not an attempt to introduce a new parasite, the object being to artificially increase the numbers of an already established insect, thus transforming a rare species into a valuable control factor.

To summarise the control measures:—Spray with arsenate of lead, commencing with a calyx spray as soon as the petals have fallen, following thereon with several cover sprays; bandage the trees and examine regularly and destroy the larvæ assembled under the bands; destroy all windfalls; thoroughly clean the packing sheds; scrape loose bark from trees and fill up all cracks and crevices thereon; judiciously thin out heavy crops of fruit.

### The Woolly Apple Aphis.

The two preceding pests just dealt with in this chapter, namely, the Queensland fruit fly and the codling moth, have every reason to be regarded as the two most important apple pests in this State. The one now under consideration is, however, a close competitor for inclusion in the category of highly destructive enemies of the apple. Like the codling moth, it has gradually become widely distributed throughout

the world, and there are probably few regions in which apple-growing is now unaccompanied by its very unwelcome presence and associated losses.

The woolly apple aphis (*Eriosoma lanigerum* Hausm.) belongs to the family Aphididæ in the order Hemiptera. The popular name just quoted is that under which it has long been known in Australia, but in England it is very frequently referred to as American blight, while on the continent of Europe it is often spoken of as the blood-louse. The name blood-louse has been suggested by the stain left when the bodies of this aphis are crushed in the hand.

This pest is certainly not a native of Australia, and it would appear that either North America or Europe must accept the somewhat unwelcome responsibility for having presented it to the apple-growers of the world. It was described in Europe by Hausmann in 1802, but according to French, of Victoria, there are records of its occurrence in England as far back as 1789. The same authority also states that it is said to have occurred in Victoria as early as 1849.

## Nature of Injury.

The woolly aphis feeds by means of the piercing mouth parts which characterise the order of insects to which it belongs, and as a result of its feeding activities very typical gall-like malformations (Plate 4, fig. 4) are produced on the infested branches and roots, for this pest works both under ground and above ground.

It characteristically feeds in colonies and the injurious effects produced by the constant feeding of large numbers of aphids on the branches and roots must obviously be very prejudicial to the welfare of the tree. Not only is the vitality of the tree reduced by the removal of its sap, but, as a reaction to infestation, the typical deformities already mentioned are produced. While infestation may be a serious matter in trees of any age, it may even be fatal in its results on young stock. It is frequently claimed that the underground colonies of this pest feeding on the root system produce a far more prejudicial effect on the tree's vitality than the more conspicuous colonies feeding on the branches.

## Plants Attacked.

Among cultivated fruits the apple is outstanding as the host plant of this pest. Infestation of pear, quince, and plum has also been recorded, but such occurrences are so extremely rare that the pest might almost be described as exclusively an apple insect at least so far as the orchardist is affected by its presence. This, however, would not be true so far as trees in general are concerned, for in the course of a detailed study of the life history of this pest in North America it was shown that it winters on the elm-trees. The mountain ash and hawthorn are also attacked in the United States.

## The Aphis.

This species of aphis is characterised by a copious secretion of wax which is deposited as a powdery bluish-white substance over the surface of the body. There is, in addition, a secretion of long waxy threads or filaments, which in the branch-feeding colonies are white and fluffy; hence the popular Australian name woolly apple aphis. These

threads also occur in the root-feeding colonies, but they are there of a somewhat bluish-white tinge rather than the pure white colour so typical of the branch-inhabiting individuals.

A close examination of these white woolly masses will show that they merely screen a large number of small oval aphids which have been variously described as being dull purplish brown, slaty blue, or plum-coloured.

The life history of this species has been studied in very considerable detail in the United States, but, so far as is known, it has received but little attention in this country.

## Control Measures.

The control of the woolly apple aphis has been attempted along three distinct lines, and at the present moment it can be claimed that, in the Stanthorpe district, these three types of control measures constitute between them a very effective check upon this potentially destructive insect.

The first of the control measures referred to is the selection of trees that will be resistant to the attacks of this pest at least on the root system. This was successfully accomplished many years ago, and it has long been the practice to work apples on a stock that has shown resistance or immunity to infestation. For this purpose the Northern Spy and the Winter Majetin have been largely availed of. If the trees are worked on these blight-resistant stocks, then the orchardist need not worry about infestation on the root system, and he can concentrate his attention on the infestation on the branches. This success in eliminating the underground colonies of the aphis constituted a very marked advance in the direction of achieving effective control.

For the control of the branch infestation spraying has been much in favour, nicotine sulphate being employed in summer and oil sprays in winter. To effectively control these above-ground colonies the nicotine sulphate should be sprayed under high pressure close to the infested limbs, so that a drenching spray is produced and the insects thus effectively reached. The oil sprays may be used in winter, but they cannot be employed with the drenching effect referred to in the application of the nicotine sulphate sprays, otherwise excessive and injurious quantities of the oil sprays will collect at the butts of the treated trees. However, if the spraying with nicotine sulphate has been satisfactorily performed in summer and autumn, only a mist-like spray will be necessary in the case of a winter application of a miscible oil. Unfortunately, repeated spraying with nicotine sulphate is necessary for the control of the branch-infesting colonies of this pest during summer and autumn. The orchardist is particularly busy at that time of the year, and hence the necessity for frequent spraying imposes a heavy burden not only on his pocket but on his time, which is so urgently required for other operations on the orchard. The employment of a third type of control measure has, however, very materially reduced the burden of spraying; in fact, it has at present largely but not completely eliminated the necessity for doing so. Long may that continue to be the case.

The third line along which control has been attempted is the utilisation of the services of natural enemies—i.e., the biological control method. Much has been written of late years on this subject, and some

Fig 4

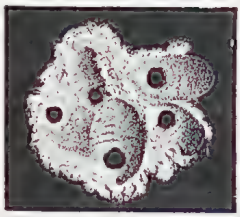

Fig 5

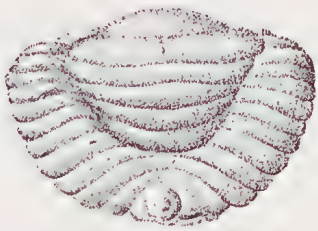

Fig 1

Fig 2

Fig 3

PLATE 4.—THE WOOLLY APHIS PARASITE (*Aphelinus mali* Hald.).

Fig. 1.—Larva of *Aphelinus mali* × 40.
Fig. 2.—Pupa of *Aphelinus mali* × 40.
Fig. 3.—Imago or adult of *Aphelinus mali* × 30.
Fig. 4.—Twig showing parasitized and unparasitized woolly aphis, all those on the lower colony being parasitized, whereas only a few on the lower edge of the upper colony have been attacked. Natural size.
Fig. 5.—Aphis showing the emergence holes of *Aphelinus mali* × 6.

strikingly successful results have been obtained in its application. One must never, however, lose sight of the fact that the prospects of success warrant the expenditure of time and money on this control measure in only a comparatively limited number of problems. However, in the case of woolly apple aphis infestation in the Stanthorpe district it appears to have justified itself in a highly gratifying manner.

The attempt at biological control commenced in 1923 when a colony of a small wasp parasite, *Aphelinus mali* Hald. (Plate 4, fig. 3), was obtained from New Zealand by Hubert Jarvis. This parasite is a native of North America, whence it had been introduced to the former country by the officers of the Cawthron Institute.

The parasite in question is a typical Chalcid wasp measuring about $\frac{1}{25}$ inch in length. It lays its eggs in the bodies of the woolly apple aphis, and the larvæ (Plate 4, fig. 1), hatching from these eggs, feed on the body contents of the destructive insects. When full-grown, the parasite larvæ transform to pupæ (Plate 4, fig. 2) within the woolly aphids, which are by that time dead and consist merely of hard empty shells. In this stage the body contents of the parasites are completely reorganised and the adult wasps are produced. These emerge by cutting circular holes in the shells of their dead hosts (Plate 4, fig. 5).

As already indicated, this introduction has been very successful and has materially reduced the cost of controlling woolly apple aphis.

## The San José Scale.

The San José scale (*Aspidiotus perniciosus* Comstock) is probably one of the most widely known of the many pests attacking deciduous fruit-trees. Furthermore it is conspicuous among the most destructive of the numerous scale insect pests. It first acquired notoriety in the San José district of California some fifty or sixty years ago, hence the name by which it is popularly known. It is believed to be a native of China, whence it was unfortunately imported to California. This undesirable immigrant is thought to have reached Australia in 1894.

### Nature of Injury.

This pest attacks the trunk, branches, leaves, and fruit of infested trees (Plate 5, figs. 8, 9, 10), and a characteristic reddish or pink discoloration is usually associated with its presence wherever it is feeding on the plant tissue. If immediate steps are not taken to deal with the pest when it shows up in an orchard, the infestation increases with quite extraordinary rapidity, and may become sufficiently acute to eventually kill the attacked trees. This insect, like all other species of scale insects, feeds by sucking the plant sap, and the opinion has been expressed that it has a more prejudicial effect on its host plant than any other scale insect attacking fruit-trees.

### Plants Attacked.

The San José scale has a very wide range of food plants, and among the deciduous fruit-trees attacked mention may be made of the following:—Apple, apricot, cherry, peach, pear, plum, prune, and quince.

### Life Cycle Stages.

The female scale when full-grown (Plate 5, fig. 6) is roughly about the size of a pin-head, and is almost circular in outline and is slightly

FIG. 1.

FIG 3.

FIG. 2.

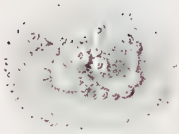

FIG. 4.

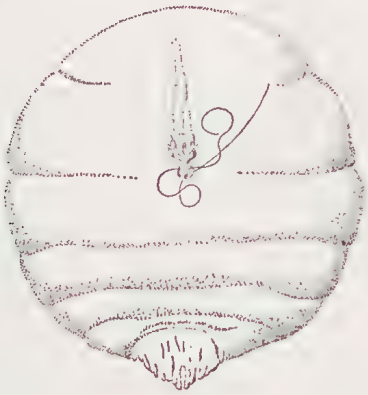

FIG. 5.

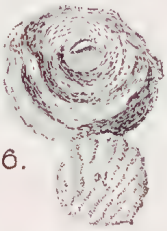

FIG. 6.

FIG. 7.

FIG 9

FIG 8.

FIG 10.

PLATE 5.—THE SAN JOSÉ SCALE (*Aspidiotus perniciosus* Comstock).

Fig. 1.—Young larva × 57.
Fig. 2.—Pupa of male × 57.
Fig. 3.—Adult male × 32.
Fig. 4.—Colony of scales in various stages of development × 4.
Fig. 5.—Adult female × 32.
Fig. 6.—Adult female scale turned over to reveal the insect itself × 12.
Fig. 7.—Male scales × 12.
Fig. 8.—Pear fruit, showing infestation.
Fig. 9.—Apple twig, showing infestation.
Fig. 10.—Plum twig, showing infestation.

convex. The scale itself is a greyish-brown colour, and is merely a waxy secretion with incorporated moulted skins which covers and protects the actual insect underneath. The soft-bodied yellowish insect (Plate 5, fig. 5) is circular in shape and is legless.

The male scale (Plate 5, fig. 7) is smaller than the female scale, and is somewhat different in shape, being distinctly more elongate. The adult male insect (Plate 5, fig. 3) is totally different from the female, and is a small delicate insect provided with a single pair of wings.

The young scale insects (Plate 5, fig. 1) are lemon yellow in colour, and possess three pairs of legs. They are very small, and can just be seen with the naked eye.

### Life History.

The males and females mate, and several weeks after mating the females commence to give birth to living young, as many as several hundreds being frequently produced by a single female. The small lemon-yellow young or larva leaves the protection of the mother scale and crawls over the tree in search of a suitable spot at which to settle down. Having found such a spot, which is generally obtained in a few hours, the young insect inserts its long, thin, threadlike, piercing mouth parts into the plant tissue and commences sucking the sap. The body gradually becomes covered with waxy threads, and eventually the typical protective scale is produced. The young insects moult in about a fortnight, and they then lose their legs. The males undergo two more moults and then emerge as delicate two-winged insects. The females moult a second time and remain legless, wingless insects. They then mate with the males and subsequently commence to produce living young. Definite figures with respect to the number of generations produced each year in Queensland are not available, but in North America it is believed that three or even four may be produced each year. Bearing in mind this fact, coupled with the rate of production of young per female, it is not difficult to understand that, where this pest is neglected, infestation may rapidly become so serious that the bark is smothered in a mass of scales which give it a greyish scurfy appearance.

### Control Measures.

San José scale in a well-established orchard can be quite effectively controlled by spraying during the winter months, using either lime sulphur or miscible oils. If only a few infested trees occur in a very young orchard, it is probably worth while to destroy these trees in the hope of exterminating the pest for the time being, although sooner or later the pest will come in from neighbouring orchards. Nursery stock should be fumigated to destroy any scale insects that may be present.

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# DISEASES OF DECIDUOUS FRUITS.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

The diseases discussed in these notes are downy mildew, oidium or powdery mildew, and anthracnose or black spot, all attacking grapes; powdery mildew of pome fruits; prune rust, brown rot, black mould rot, and leaf curl attacking various stone fruits.

## Downy Mildew of Grape Vine.

Downy mildew is the most serious disease with which grape-growers have to contend. It is now distributed throughout practically all the chief vine-growing centres of the New and Old Worlds wherever climatic conditions are suited to its development. Australia was fortunate in being one of the last countries to be visited by this disease, which only appeared in epidemic form during the 1917-18 growing season. The malady is one which can be effectively controlled by the application of a fungicide, and hence spraying has become a matter of general routine with all efficient growers except in the drier centres of the State.

### Symptoms.

All parts of the vine, including stems, leaves, and bunches, may be attacked in their younger stages. As the tissues mature they become less susceptible to infection. On the leaf the first symptoms appear as light greenish-yellow spots of a roughly circular or sometimes angular shape. When held up to the light these will be seen to be of a clearer and more transparent appearance, giving rise to the name of "oil-spot" which is applied to this stage. If the weather is moist, a delicate white downy growth will be produced on the under surface of the spots as the fruiting bodies of the fungus causing the disease are developed (Plate 9, fig. 1). During hot and dry conditions the fructification will not take place, and the spot turns brown and dries out. By coalescence of the spots large areas of the leaf surface may be affected. The presence of even a small amount of dead tissue may cause distortion of the developing leaf. Affected leaves usually fall off prematurely.

The fruit may be attacked at any period of its development until it commences to colour. When infected during the early stages of growth the bunch usually becomes covered with a downy fungus growth, which has suggested the name of "grey mould" for this particular form of attack. If the berry is approaching maturity the mould is rarely produced. In either case the fruit eventually becomes brown and shrunken and dries up (Plate 9, fig. 1).

### Cause.

The disease is due to a fungus (*Plasmopara viticola*) belonging to the Peronosporaceæ or downy mildew group, from which are derived many very important plant parasites. When infection has taken place the fungal threads or mycelium ramify between the cells of the plant tissue, absorbing nourishment from these by means of short haustorial branches. After an incubation period of about seven days, during which a definite oil-spot has been formed, the parasite is in a condition to

*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

produce its fruiting stage should the right weather conditions be available. Spore formation will take place readily at a temperature from about 60 to 80 deg. Fahr., provided abundant moisture is present. Short aerial hyphæ grow out four to eight together through the openings of the stomata or breathing pores found on the lower surface. These branch and rebranch, forming a tree-like growth, and from each of the ultimate short peg-like branches there is developed a delicate thin-walled ovate spore. These spores are produced in countless numbers, and, being easily carried about by wind and rain, serve to spread the disease during the growing season. Should a spore be deposited on a leaf when moisture in the form of dew or raindrops is present, its contents will divide up into several smaller portions, each provided with two thread-like vibratile flagella. These motile structures are known as zoospores. They escape by rupture of the parent cell or sporangium, and make their way through the film of surface moisture to one of the breathing pores of the leaf, by means of which opening they gain access to the plant.

The summer spores are delicate in structure and are unable to live over from one season to the next. For this latter purpose the fungus is provided with a thick-walled resistant spore known as the oospore. These are formed towards the end of the season within the tissue of the leaf, and remain associated with the rotting foliage during the winter. In the spring, if the weather is sufficiently wet to give rise to a certain amount of water accumulation round the vines, the oospore will germinate in this and give rise to a sporangium which produces zoospores as in the case of the summer spores described above. If another shower should fall and splash the zoospores on the foliage, the infection for the season will be commenced.

## Control.

Consideration of the life history of the organism briefly outlined above will show that for a severe outbreak of downy mildew there is necessary a certain temperature combined with abundant moisture. The temperature during the Queensland season, except on abnormally hot days, is quite suitable for mildew development. Rain during the early part of the season in sufficient quantity to provide the necessary moisture requirements for the starting of an attack is always of likely occurrence, while the summer rains provide ideal conditions for its epidemic development. Hence any grower who wishes to make certain of his crop should be prepared to carry out the undermentioned spraying programme, which has been proved to give adequate protection from the disease. It should be noted that the spray to be effective must be present on the leaves before the germination of the spores. Once the fungus has penetrated within the tissues of the plant all attempts to stop its development will be fruitless.

Bordeaux (6-4-40) and Burgundy (6-8-40) are the spraying mixtures commonly used, the advantages lying with the former. Applications should be made as follows:—

(1) As soon as the shoots have reached a few inches in length;
(2) Just before the flowering period;
(3) As soon as the young fruit has set;
(4) Additional applications will depend on weather conditions.

If this is at all wet the vines should be sprayed as often as necessary to keep the foliage well covered. Some growers make it a practice to spray once a week throughout the season until the fruit is coloured.

PLATE 6.—OIDIUM OF THE GRAPE.

## Oidium or Powdery Mildew of Grape Vine.

Powdery mildew is a disease that has been in Queensland for many years and is quite familiar to most growers. All the younger green parts of the vine, including leaves, canes, and fruit, may be attacked, the damage done depending very largely upon weather conditions. Warm and moist but not necessarily wet weather is most suitable to the development of Oidium.

### Symptoms.

On the leaf the fungus appears as greyish-white floury patches on the upper and lower surfaces but more conspicuous on the former. This can usually be easily distinguished from the more elevated downy growth found on the under surface of leaves attacked by downy mildew. The white powdery covering may also develop on the young shoots and the canes. This attack will result in a cessation of growth, and if the part is in the immature developing stage deformation may take place.

The most severe damage takes place when the bunch is affected. If this happens before or shortly after flowering, the flowers and small developing fruit which become covered with the mildew soon dry up and drop off. When older fruit becomes mildewed the growth of the skin is retarded and splitting often occurs. Their appearance is greatly impaired even when this cracking does not take place. (Plate 6.)

The retarding effect of powdery mildew on the growth of the vines during one season will cause a reduction in the quantity and quality of the crop the following year.

### Cause.

Powdery mildew is caused by a fungus parasite now known as *Uncinula spiralis*. The form in which this organism is commonly met with was first described under the name *Oidium Tuckeri*—hence the common name of Oidium. Later a second and higher form of the fungus was discovered which necessitated the change to the above.

This fungus differs from the organism causing downy mildew in that it belongs to the ectoparasitic type. This difference should be noted since it is of special importance when considering control measures. The fungus grows entirely on the outside of its host, where the mycelial threads form a fine white web-like growth over the affected parts. From the surface mycelium small knob-like processes or haustoria are given off which penetrate the epidermal cells and from them absorb nourishment. The injury done to the plant cells in this way gives rise to dark specklings on the surface of the region affected.

If the weather is warm and moist the fungus will soon proceed to the formation of the fruiting stage. Short upright branches are given off which cut off in succession three or four clear oval spores. These spores serve to spread the disease during summer. They germinate by producing a delicate thread-like germ-tube which commences a superficial growth over the plant surface as before. Oidium spores need for their germination only a sufficiently moist atmosphere to prevent desiccation. The water film so necessary for the zoospores of downy mildew need not be present.

Besides this summer spore a resting spore is produced towards the close of the season. It is of a type which places the fungus in the large group known as the Ascomycetes or sac fungi. This reproductive body consists of a minute rounded structure appearing as a black speck on the leaf surface. Radiating from the surface of these perithecia, as they are

called, are a number of appendages, while within are contained about six sac-like cells or asci each containing four to six ascospores. The ascospores reach the foliage in the spring and commence the new season's infection.

In some countries, of which Queensland is one, the ascospore stage does not appear to occur except perhaps rarely, and it is possible that in this case the fungus overwinters by means of summer spores and mycelium hibernating among the dormant buds of the vine.

### Control.

On account of the ectoparasitic nature of the causal fungus one is able actually to cure as well as prevent an attack of powdery mildew. Sulphur applied in the form of a dust will cause the death of the superficial mycelium and spores.

Application should be made as follows:—

(1) When the new shoots are about 12 inches long.

(2) When the vines are in flower. In addition to protecting the young fruit, sulphur applied at this time has an exceedingly beneficial action on the setting of the grapes.

(3) Further applications should be made whenever the disease shows signs of development.

Sulphuring is best done on a warm day, but an application during exceptionally hot weather should be avoided, as some foliage-burning may occur under these conditions.

## Anthracnose or Black Spot of Grape Vine.

Anthracnose is a disease which does not often appear in the epidemic form which may be assumed by the two mildews; nevertheless, during wet seasons considerable damage may result from its presence in individual vineyards.

### Symptoms.

The disease makes its appearance on the early spring growth. The young leaves, tendrils, and shoots develop black patches of dead tissue which lead to a stunting and distortion of the expanding organs. The most characteristic symptoms are displayed by the lesions on the canes. These appear first as small dark-brown or black spots. The fungus responsible for their development extends through the tissue both radially and in towards the pith, breaking down the plant cells in its progress, with the result that a more or less conspicuous open black scar or canker is produced. (Plate 8, fig. 2.)

If the bunch is affected in its early stages it may be reduced by destruction of flowers and fruit to nothing more than the blackened and withered fruit-stalks. When older berries are attacked a bird's-eye spotting results. The spots are slightly depressed circular areas having a greyish-pink centre surrounded by a dark-brown to black margin. (Plate 7.) Besides the unsightly appearance, the hardening of the skin may cause splitting to take place.

### Cause.

Anthracnose of the grape is due to the attack of a fungus (*Manginia ampelina*) which resembles in general characters the one responsible for bean anthracnose. Spore formation takes place in the base of the cankers and on the fruit-spots, where the spores in mass give a greyish-pink appearance to the affected area. Clusters of short upright hyphæ

PLATE 7.—ANTHRACNOSE OF THE GRAPE.

arising from beds of interwoven fungal threads cut off from their tips numerous clear oval spores. These tend to stick together in mass, so that spore dispersal and spread of the disease is not so rapid as in the case of the mildews.

The fungus overwinters principally in a vegetative form in old scars. Towards autumn the fungal threads become massed together in the more superficial regions of the stem cankers, and condense into a dark thick-walled resistant form known as a sclerotium. As soon as moist or wet weather occurs in the spring, the exposed portions of these sclerotia produce from their surface the minute spore-bearing structures similar to those developed the previous season on the young lesions. The spores thus produced serve to infect the early spring growth and from the spots so formed the distribution of the disease takes place as before.

### CONTROL.

It has been found as a result of long experience that anthracnose can best be controlled by attacking the fungus in its hibernating stage. For this purpose any vines which bear the cankers formed during the previous growing season should be thoroughly swabbed with the following mixture:—

| | |
|---|---|
| Iron sulphate .. .. .. .. | 20 lb. |
| Sulphuric acid .. .. .. .. | 8 lb. |
| Water .. .. .. .. .. | 10 galls. |

The iron sulphate is dissolved in 10 gallons of warm water in a wooden vessel. The sulphuric acid is then added by carefully pouring in a thin stream, with constant stirring so as to avoid splashing and excessive heating. This solution will corrode metal vessels, and even wooden ones are best covered with tar or paraffin.

The solution should be applied just before the buds commence to move. Previous to this all badly diseased and unwanted wood will have been removed and burnt. The swabbing is conveniently done by means of a brush or small mop. Care must be taken that the whole vine and especially any old scars are thoroughly wetted.

Although the swabbing treatment will greatly reduce the amount of spring infection, it cannot be expected that this will be eliminated entirely. It is therefore advisable as a further precaution to spray the vines when the shoots are a few inches in length, and again a fortnight or three weeks later, with Bordeaux mixture of 6-4-40 strength. The applications of Bordeaux made subsequently for control of downy mildew will serve as a further check on anthracnose development.

## Powdery Mildew of Apple.

The apple, pear, and quince may all at times be attacked by powdery mildew, but of these the apple is by far the most seriously affected. The fungus causing this mildew is not so dependent on wet weather for its development as are many other fungus parasites, and therefore damage may result from this disease even during a fairly dry season.

### SYMPTOMS.

All current season growth in the form of shoots, leaves, blossoms, and occasionally fruit is liable to attack. On the under surface of young leaves greyish-white powdery patches appear. These enlarge and may cover the whole leaf and then extend down the stalk to the twig. Affected

PLATE 8.

Fig. 1.—APPLE TWIG AFFECTED WITH POWDERY MILDEW. (Note the white fungal coat and resulting dieback.)

Fig. 2.—GRAPE VINE EXHIBITING THE CANKER STAGE OF ANTHRACNOSE.

leaves have their tissue hardened, with the result that subsequent growth is restricted and the foliage is stunted and deformed. The same white fungus growth will spread over the young twigs, and will also appear on some of the buds. In the latter case the floral parts become shrivelled and no fruit is formed. Sometimes young fruit are affected soon after they have set, with the result that a russeting is produced. After leaf-fall the affected twigs will be easily picked out by their white, silvery appearance. Many of the buds will be found to be dead, and the shoot itself may be killed back. (Plate 8, fig. 1.)

### Effects.

Although the fruit often escapes injury, less obvious damage of a serious nature may result from mildew attack. The reduction in healthy foliage growth will mean a diminution in food supply, with consequent reduction in quantity and quality of the next crop. When the twigs are badly attacked the growth of next year's buds will be greatly interfered with, and these as well as part of the terminal itself may be completely destroyed. The setting of the fruit will be reduced by blossom infection in the spring.

### Cause.

The cause of apple powdery mildew is a fungus (*Podosphæra sp.*) which is allied to the organisms producing powdery mildew of the grape, cucumber, &c. Like these the apple fungus is ectoparasitic in its habit. In other words, the fine threads making up the fungal plant lie entirely on the surface of the host plant, nourishment being obtained by means of short suckers which penetrate the epidermal cells. It is these superficial mycelial threads which give rise to the white patches mentioned above. From the surface growth short upright threads are given off, and these, by a succession of transverse partitions, cut off numbers of delicate oval spores which, when distributed by wind and rain, serve to spread the disease throughout the orchard.

Besides these summer spores or conidia, the fungus forms towards the latter part of the season another type of fruiting body known as a perithecium. These are dark-brown rounded bodies just visible to the naked eye, clusters together forming dark areas over the previously white patches. Within the perithecia are produced rounded sacs, each of which contains about eight ascospores. The ascospores serve to some extent to carry the fungus through the cold months. The chief method of overwintering is, however, by means of fungal threads which penetrate among the scales of the leaf and flower buds and there hibernate until these organs commence to open in the spring. The fungus then grows along with the developing buds, and affects the young leaves and flowers as described above.

### Control.

Since the fungus overwinters in affected twigs, all those exhibiting the white appearance denotive of the presence of mildew should be removed and burnt during the winter pruning.

The trees should be sprayed with lime sulphur 1 in 50—

(1) Just before the flowers open.

(2) When the last petals are falling. N.B.—For this and the next application the fungicide may be combined with the lead arsenate of the codling moth spray.

(3) About a fortnight after the last.
(4) Further applications will be necessary should powdery mildew again make its appearance.

## Prune Rust.

Prune rust is a disease to which most of the cultivated varieties of stone fruits are subject, the peach and plum being most seriously affected. The disease is world-wide in distribution, and occurs in practically every region where its host plants are cultivated.

### Symptoms.

The presence of prune rust is first denoted by the appearance on the upper surface of the leaf of somewhat angular spots of a greenish-yellow colour. These are few and scattered, or more numerous when they may become confluent and form large discoloured areas. The spots later darken to various shades of brown as the tissue dies and dries out. Frequently the leaf falls before this stage is reached. On the under surface of these spots the fruiting bodies of the fungus causing the disease appear as clusters of small brown powdery pustules (Plate 11, fig. 1). In the case of the peach the disease may also affect the young branches with the production of somewhat elongated brown pustules which rupture the bark. During a bad attack when rust appears early in the season, the fruit of both peach and apricot may become disfigured with brown slightly sunken areas as a result of infection by the rust fungus. Occasionally the stems and fruit of other varieties may be attacked.

### Effects.

Rust usually attacks the lower leaves first, and these sooner or later turn somewhat yellow and fall. The disease then progresses more or less rapidly, according to weather conditions, up the branches, so that finally there may be left only a small tuft of leaves at their tips. Spotting may begin to appear about December or January, but during a fairly dry season it is not usually until the approach of autumn that the main defoliation occurs. It is on this account that some orchardists consider the effect of prune rust to be merely the leaf-fall natural to the approach of winter, and take no steps to combat a disease which, given the right climatic conditions, may be the cause of considerable loss.

It must be remembered that, since the peach, for example, produces its fruit on the previous season's wood, the premature loss of leaf in the one season, by reducing the development of this bearing wood, may affect the next season's crop. During a wet season defoliation may take place before the fruit has fully matured, with the result that the crop will be of poor quality or rendered worthless by sun-scald. Spotted peaches are unsightly in appearance, and, as the lesion extends some distance into the flesh, the fruit is rendered unfit for canning.

### Cause.

Prune rust is caused by a fungus (*Puccinia prunispinosæ*) which, like other rust fungi, exhibit more than one fruiting stage. The more common spore form, which serves to spread the disease during the current season, is known as the uredospore. This is a somewhat angular brown spore produced from the tips of short erect fungal threads or conidiophores, which are closely aggregated together to form the pustules or

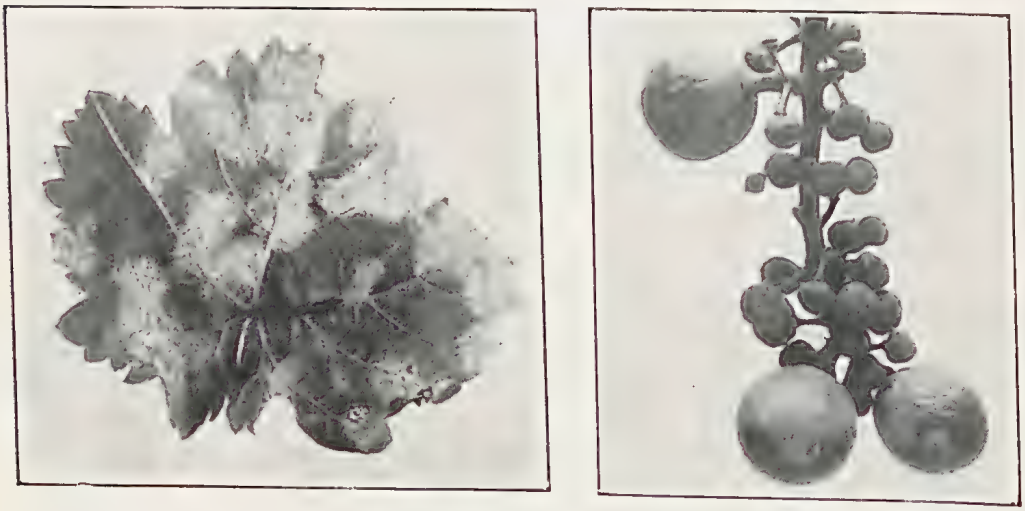

Fig. 1.—DOWNY MILDEW OF THE GRAPE.

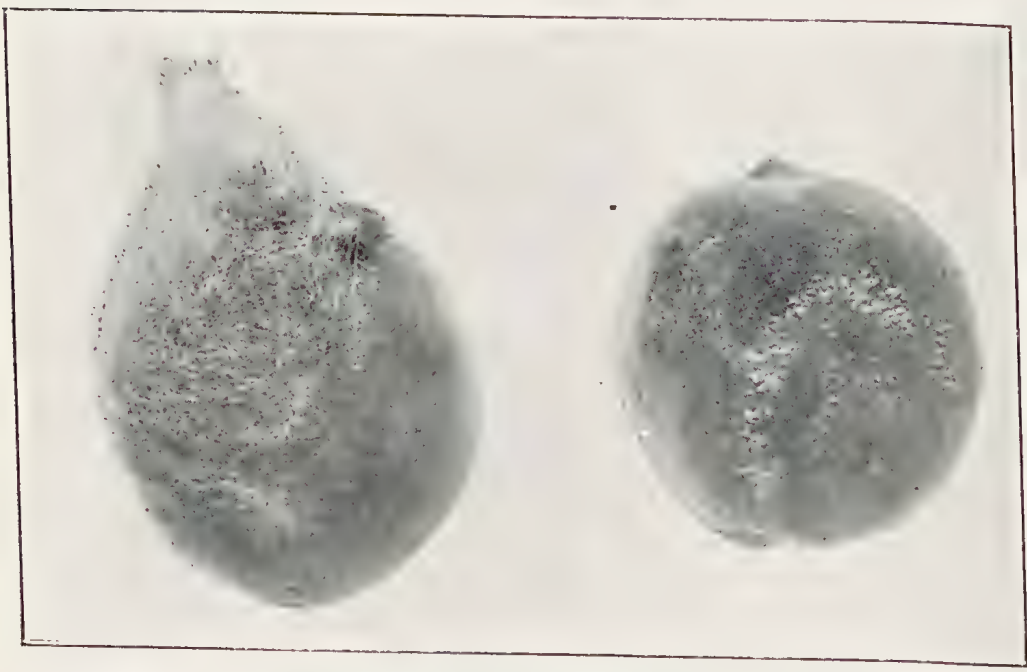

Fig. 2.—TWO PEACHES ILLUSTRATING THE DIFFERENCE BETWEEN BLACK MOULD ROT (left) AND BROWN ROT (right).

PLATE 9.

sori mentioned before. Towards the autumn there may appear, more especially on the plum, pustules, of a dark-brown almost black colour. In these sori are borne a somewhat thicker and more resistant two-celled spore, known as the teleutospore, which serves to carry the fungus over the winter and creates fresh infection in the following spring. A warm wet season is most conducive to rust development.

### Control.

1. Prune out all infected twigs.

2. So far as is practicable, burn or plough under the fallen leaves, on which the fungus spores may be present in enormous numbers.

3. Spray as follows:—

(*a*) Bordeaux (6-4-40) or lime sulphur (1 in 10) just before the buds commence to swell.

(*b*) Bordeaux (4-4-40) or lime sulphur (1 in 50) as the leaves are expanding. Owing to the susceptibility of peach foliage to Bordeaux injury, peaches should receive the latter spray. Care must be taken that the fungicide reaches both sides of the leaves.

(*c*) Should rust make its appearance later in the season, the tree should receive a further spraying with lime sulphur (1 in 80).

## Brown Rot of Stone Fruits.

Brown rot is probably the most serious disease affecting stone fruit in Queensland. Peaches, nectarines, and plums suffer most. Less frequently, apricots, cherries, and occasionally pome fruits are attacked.

### Symptoms.

Rotting of the fruit is usually the most striking symptom of brown rot, but there are other important manifestations which are often overlooked. The disease may commence in the early part of the season as a blossom blight. The floral organs turn brown and wither up but usually still remain attached. If the weather is moist, light-brown powdery spore masses, formed by the fungus causing the disease, may appear on the affected portions. The young twigs, and occasionally the leaves, may be attacked, either by direct infection by the fungus working down from diseased flowers or from spores developed on old mummied fruits. The fungus may pass through the smaller twigs into an older branch, and there produce a large irregular wound or canker.

The fruit may be attacked at any period of its growth, though it is more commonly affected when approaching maturity or during storage. The first symptoms appear as a small brown spot on the skin of the fruit, often associated with a slight injury. If the atmosphere is moist this spot will enlarge rapidly and may involve the whole fruit in twenty-four to forty-eight hours. When the brown area is an inch to an inch and a-half in diameter the fungus usually commences to form its fruiting stage. This appears on the surface of the affected region as light greyish brown powdery tufts often arising in more or less concentric rings (Plate 10, fig. 2). The fruit rot is at first soft, but later the decomposition ceases and the flesh dries out with the production of a firm, dry, shrunken object commonly known as a "mummy" (Plate 10, fig. 1). In pome fruits there is a tendency for the rotting fruit to turn black rather than brown.

## CAUSE.

Brown rot is due to the attack of a fungus (*Sclerotinia fructicola*) belonging to the Ascomycetes or sac fungi, and in common with many other members of the group exhibits two distinct methods of reproduction. The common form met with in Queensland is known as the monilia stage. Clusters of thread-like hyphæ push through the surface of the fruit, branch once or twice, and then divide up into bead-like chains of cells which are cut off as spores when mature. It is masses of these structures which form the greyish tufts described above.

The second and perfect stage of the fungus is found (apparently rarely in Queensland) in connection with old mummies which have lain on the ground for a year or more. There is developed from the fungus mycelium within the dried fruit small-stalked saucer-shaped structures. The upper surface of these receptacles consists of narrow, cylindric, sac-like cells, each of which contains eight smaller ascospores. In countries where this stage is produced in quantity the ascospores serve to start the spring infection of the blossoms.

In Australia the fungus overwinters as dormant mycelium, either in cankers and invaded twigs or in the mummified fruit lying on the ground or still attached to the tree. Within the tissue of these organs the massed fungal threads live through the winter in all security. At the approach of warm, moist, spring weather the mycelium again becomes active and bursts through the surface layers to form the greyish-brown tufts of spores by means of which the spring infection commences.

## CONTROL.

1. Prune out all twigs whose appearance might suggest infection with brown rot, as otherwise they may be the means of carrying over the disease to the next year.

Carefully remove all mummied fruit and collect those already fallen and destroy by fire or burying.

2. Spray with a fungicide. Owing to the ease with which the peach and some other stone fruits are injured by the common spray mixtures, it is difficult to obtain a spray which will be sufficiently potent against brown rot and yet not injure the plant. C. C. Brittlebank, in Victoria, has lately tried out the following schedule on peaches with considerable success:—

(1) Just before the buds begin to swell, spray with lime sulphur 1 in 9 of Baumé 32 deg.

(2) As buds show pink: Lime sulphur 1 in 35.

(3) As the fruit begins to colour: Lime sulphur 1 in 80.

(4) One month to three weeks before picking: Lime sulphur 1 in 100.

3. Examination of affected fruit at the market would suggest that an injury of some form is often responsible for brown rot infection. Care should therefore be exercised during picking and packing operations to see that injuries in the form of bruises, scratches, &c., are so far as possible avoided. Affected fruit should not be touched while handling sound ones, and all rot material should be kept out of the packing shed. When possible avoid picking and packing when the fruit is wet.

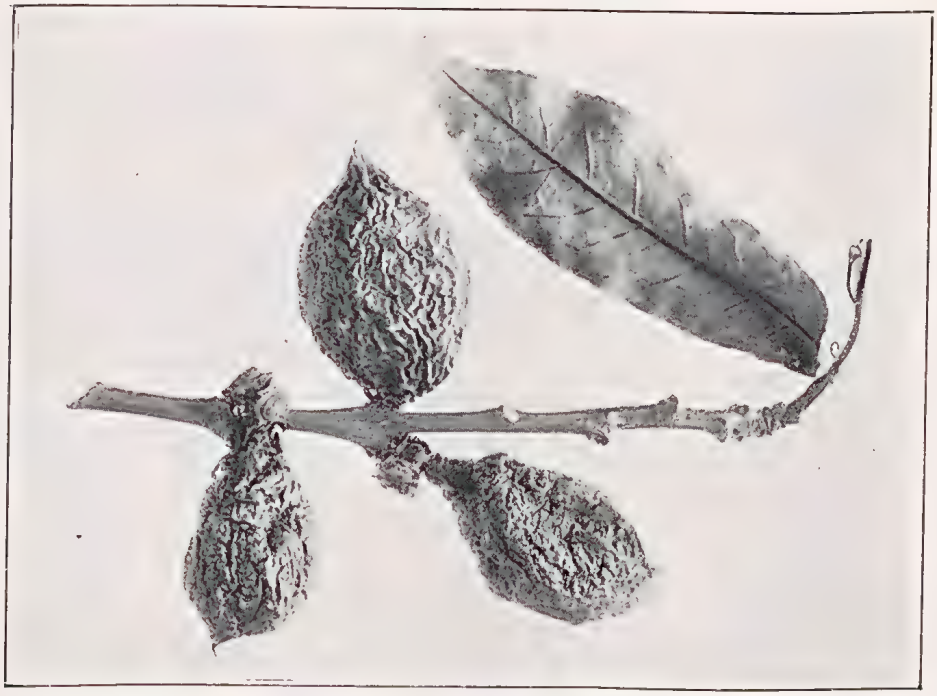

Fig. 1.—Nectarine fruit mummified as a result of Brown Rot attack.

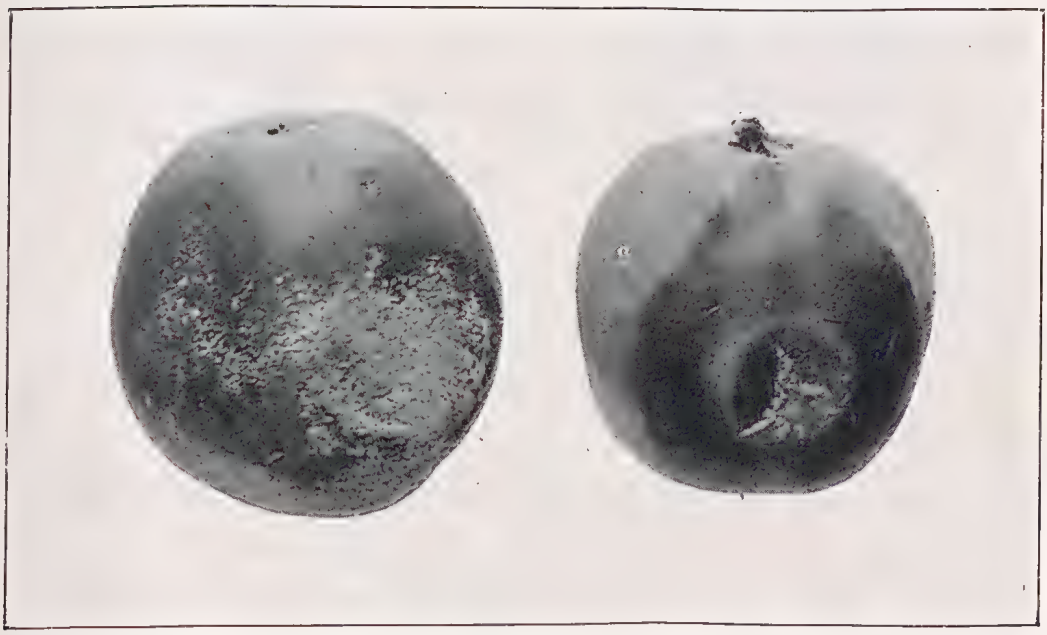

Fig. 2.—Brown Rot of Nectarine. In the fruit on the right infection has originated in a bruise.

PLATE 10.

## Black Mould Rot of Stone Fruits.

Black mould rot is a storage trouble sometimes confused with the true brown rot. It has been found affecting more especially peaches and plums, and in connection with these varieties has in some seasons been responsible for even more loss than brown rot.

### Symptoms and Cause.

This rot commences as a small brown spot on the surface of the fruit, and in its early stages is indistinguishable from brown rot. Later, instead of the small compact powdery spore masses characteristic of this latter disease, there arise long delicate greyish-white threads of mould growth, which radiate out from the affected region (Plate 9, fig. 2). This mould growth belongs to the fungus (*Rhizopus nigricans*) causing the disease. A single mould "plant" possesses a number of root-like branched threads which ramify amongst the tissue of the fruit, which they destroy and so cause the brown rot. From the point of origin of these root-like processes there is given off a number of long slender aerial threads which are the spore-bearing structures or sporangiophores. These swell at the apex to form a globular sac or sporangium. Within the sporangium the protoplasm divides up into a great number of minute rounded spores which are finally liberated by rupture of the sporangium wall. The sporangia are at first white but as the spores mature they turn dark grey to almost black, and, being just visible to the naked eye, give a grey speckled appearance to the mould growth covering the fruit. Beside the spore-bearing hyphæ there is given off from each fungal "plant" one or more long slender threads or stolons, which grow out over the surface of the fruit until it in its turn becomes attached at some point and develops root-like processes which may penetrate the as yet uninjured skin and so commence a new point of rot.

The original infection of the fruit by means of spores appears to take place very largely if not entirely per medium of injuries to the skin, often very slight, in the form of scratches, bruises, &c. Once a point of infection has been created the mould quickly spreads by means of the stolons over the fruit and from there to the as yet sound ones adjoining. Under suitable conditions a day or two may suffice for the formation of large "nests" of rotten fruit bound together by the abundant grey mould growth commonly called "whiskers." Half a case or more may be involved in one of these nests. It is the rapid spread through a case which enables this mould when present to be responsible for greater loss on the market than brown rot.

### Control.

Since wounds appear necessary for the introduction of black mould, and the disease is one of stored fruit, control measures will have to be along similar lines to those found useful in connection with blue mould of citrus.

1. Avoid picking and packing during showery weather and when the fruit is wet. A marked increase of this rot has been noticed during periods of wet weather.

2. Take special care during picking and packing operations to see that the fruit receives no unnecessary injury. Finger-nail scratches and case bruises may be a source of trouble. All fruit showing injury or blemish should be rejected.

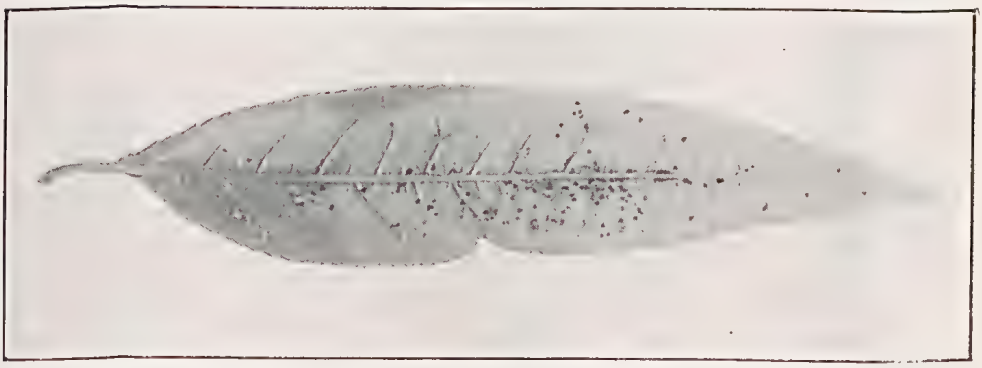

Fig. 1.—Peach leaf showing the sori formed by the Rust fungus (*Puccinia prunispinosæ*).

Fig. 2.—Peach leaves exhibiting the malformation characteristic of Leaf Curl.

Plate 11.

3. Cleanliness in the orchard and packing house is essential. All rotting fruit should be collected at frequent intervals and destroyed by fire or burying.

4. If the quality of the fruit is such as to make wrapping a justifiable outlay, this procedure would greatly reduce the loss by localising the attack to the originally infected fruit.

## Peach-leaf Curl.

Leaf curl is a disease affecting chiefly the peach and nectarine, other varieties of stone fruits being rarely attacked. Like rust, this disease is widely distributed throughout the peach-growing centres of the world. Fortunately it is one of the plant maladies most easily controlled.

### SYMPTOMS.

Leaves, young shoots, and fruit may be attacked, but the most common and characteristic symptoms appear on the first-mentioned. Affected leaves as they issue from the bud appear of a somewhat yellow or pinkish colour, and on expanding become all or in part curled and puckered (Plate 11, fig. 2). The deformed portions are considerably thicker than the normal leaf, and retain their unnatural coloration for some time. Later this is masked by the development of a grey bloom due to the formation of a layer of the fruiting bodies of the fungus causing the disease over the upper surface.

Finally the leaf turns brown and falls off. If the original infection was heavy the defoliation may be extensive. A new set of leaves is usually formed from dormant buds, but these may be developed too late to mature the fruit and next season's bearing wood. Repeated defoliation lowers the vitality of the tree and may eventually lead to death.

### CAUSE.

Leaf curl is induced by a fungus parasite (*Taphrina deformans*), which is one of the more simple type of sac fungi or Ascomycetes. The presence of the mycelial threads of this fungus within the tissue of the leaf stimulates the latter to abnormal growth both in size and number of its constituent cells. This enlargement takes place mostly on the upper side of the leaf, with the result that the leaf becomes puckered and curled as described above. Later the fungus grows out between the epidermal cells and forms on the surface a layer of close, erect, oblong cells known as asci. Each of these contains eight rounded spores known from their method of formation as ascospores. They are liberated by rupture of the enclosing sac.

Some of the ascospores fall into sheltered situations where they are able to pass the winter, to germinate the following spring and infect the developing buds. Cool, moist weather when the buds are swelling provides conditions very suitable to leaf curl attack.

### CONTROL.

This disease can be effectually checked by the application of a fungicide before the buds begin to swell in the spring. For this purpose Bordeaux mixture (6-4-40) or lime sulphur 1 in 10 may be used.

# THE UPPER BURNETT AND CALLIDE VALLEY.

## A NEW AND FERTILE AGRICULTURAL AND GRAZING REGION.

*The subjoined notes are taken from a Report by the Land Administration Board on an economic investigation of the Upper Burnett and Callide Valley Land Settlement Scheme. This settlement scheme is, according to the Report, the most ambitious land settlement project in Queensland's history and, as originally conceived, was intended to provide farms for some thousands of settlers who would engage in mixed farming. The Board felt the need of carefully investigating the whole project to make sure that the foundations of the settlement were soundly laid before releasing more land for selection. The Report is a very complete and valuable one, and these brief extracts from it will be read with interest.*

*We are also indebted to the Land Administration Board for its permission to reproduce the very fine series of plates with which the Report is illustrated.—Ed.*

### History of the Settlement.

The Upper Burnett and Callide Valley lands extend from near Eidsvold on the south to near Rannes on the north, a distance of about 120 miles, and have an average width of about 40 miles. Although termed a "Valley," the area has an elevation varying from 800 to 1,700 feet. The country embraces all classes of land from rich agricultural soils contained in many of the creek flats to third class grazing land, comprising coarsely grassed mountainous country. The average rainfall is about 29 inches.

The classification of the land made by Staff Surveyors, before the settlement scheme was commenced, was as follows:—

| | Agricultural. | | Grazing. | |
|---|---|---|---|---|
| | First Class. | Second Class. | First Class. | Second Class. |
| | Acres. | Acres. | Acres. | Acres. |
| Northern Burnett .. .. | 186,000 | 400,000 | 498,000 | 336,000 |
| Callide .. .. .. | 104,000 | 391,000 | 90,000 | 488,000 |
| Totals .. .. | 290,000 | 791,000 | 588,000 | 824,000 |
| Grand Total .. .. .. | 2,493,000 acres. | | | |

Much of the land classified as first class "grazing" land is eminently suited for dairying, as it contains many rich arable pockets. There are considerable belts of softwood and brigalow scrubs. Altogether the area may be regarded as very well adapted for a successful closer settlement scheme.

Before the advent of the settlement scheme the lands comprised in the Upper Burnett and Callide Valley were used almost solely for grazing and were mostly in the occupation of grazing selectors and pastoral lessees. Eventually Parliament authorised the extension of all three of these railways to converge on Monto, a new township in the centre of the area.

Monto lies 103 miles from Gladstone, 179 miles from Maryborough, and 172 miles from Rockhampton. Of the three railways, that connecting with Gladstone, although the shortest, was the most costly and difficult to construct, owing to the mountainous country (the Dawes Range) through which it passes. This railway has been completed to Dalkiel, and is at present under construction to Waratah, eight miles north-east of Monto. The Maryborough-Mundubbera extension is completed and open to traffic to Monto. The Rockhampton-Rannes extension is open to Thangool—63 miles north of Monto. Rails have been laid for a few miles beyond this point, and earthwork constructed still further to Mount Lookerbie, but all work has been discontinued.

PLATE 12.—THE MAIN STREET, MUNDUBBERA, 1914.

PLATE 13.—MUNDUBBERA TO-DAY.

What Mundubbera has done, several centres throughout the Upper Burnett and Callide Valley may do better.

Plate 14.—Mundubbera Butter Factory.
Successful land settlement and industrial progress are closely allied.

Plate 15.—Site of Monto, 1924, at the Commencement of Settlement.

**Railways, Roads, and Bridges.**

As part of the settlement scheme, the Department of Public Lands undertook to construct, free of cost to the Local Authorities, the necessary roads and bridges to give pioneer access to each holding. This work was commenced in 1923 and is still proceeding. After construction, the roads and bridges are handed over to the Local Authorities, who are responsible for their future maintenance.

In the early days of this work the Department did not possess adequate machinery, and many of the roads were indifferently formed. The present standard of work, which is done with the aid of modern plant, is, however, quite satisfactory, and settlers are being provided with reasonably good roads. The bridges throughout the area, constructed by the Lands Department, are first class structures.

Altogether 634 miles of road and five bridges and causeways have been constructed.

New railways were needed in order to open up this land. Without railway communication the Upper Burnett could not have been used for any industry other than grazing, and closer settlement would have been out of the question. For years prior to Parliament authorising the building of the railways, there had been great rivalry between Rockhampton, Gladstone, and Maryborough as to which branch railway should be extended to the country. Each centre was anxious to obtain the trade that was certain to flow from this rich area, and railways from each centre had already been constructed to the fringe of the proposed settlement. Existing railways reached from Rockhampton to Rannes, on the north, from Gladstone to Many Peaks on the east, and from Maryborough to Mundubbera on the south of the area.

**Water Supply.**

Expenditure by the Government has also been incurred in the provision of water facilities for settlers and in advances by the Agricultural Bank for the assistance of settlers. Both these matters are referred to in detail in the Report.

This expenditure, however, stands in quite a different category to the other expenditure on the settlement. In each instance the money advanced is in the nature of a loan to the settler, and ordinarily should be repaid by him with interest over a period of years.

The Report incidentally makes clear that modern settlement schemes are costly undertakings. If railways have to be pushed out ahead of settlement, if roads and bridges have to be constructed, and other Governmental aid granted to settlers, the burden of all this expenditure must, until the new settlement becomes productive, be carried by the general community.

**Land Settlement—Old and New Systems.**

The large expenditure that has been incurred illustrates, in a striking way, the difference between old and new settlement schemes.

In the early days of settlement a family would settle on the land, produce almost all its own requirements, and earn in actual money a very small income, which would be expended on articles which the farm could not produce. To live, rather than to earn or produce for the use of others, was the dominating purpose. Now all this has changed. The modern view is that, unless the income received from the products of the farm can approximate the money that would be earned from similar energies elsewhere, there is no inducement to settle on the land.

In former days communities established themselves by years of arduous pioneering work with little outside assistance, and railways were provided only after the settlers had demonstrated the wealth productivity of their lands, and their capacity to provide the railways with considerable business. Now the position is reversed; public expenditure goes first and settlement follows. Such public expenditure must necessarily be unproductive for a few years.

In dealing with settlement schemes the British Economic Mission, in its Report dated 7th January, 1929 (page 6), pointed out that such schemes, financed out of loan moneys, should be self supporting within a reasonable measure of time. The members of the Mission went on to say, "By this we mean that within such measure of time they should, either directly, or indirectly through the increased taxable capacity of the community and the enhanced value and price of Government-owned land attributable to the development schemes, provide at least their own working costs, interest on the loan capital invested in them, and a sinking fund sufficient to provide for its repayment when it falls due." Judged on that basis, the Upper Burnett and Callide Valley Settlement Scheme may be regarded as a sound State investment.

Plate 16.—The Main Street, Monto, To-day.

Less than five years old, Monto is a rising township, in picturesque country in the heart of the Upper Burnett. Surrounded by good dairying and agricultural land, Monto is destined to become the capital of the Upper Burnett and a country township of considerable importance.

Plate 17.—A Field of Cotton, Waratah, Upper Burnett.

PLATE 18.—"KERWEE," A FARM HOME ON THE UPPER BURNETT SETTLEMENT.

PLATE 19.—THE START OF A NEW TOWNSHIP ON THE MANY PEAKS-MONTO LINE, 13 MILES NOR EAST FROM MONTO.

The first building to be erected was the railway station-master's house.

When fully settled on the lines of the Board's recommendations, it is estimated that the settlement will comprise 1,500 mixed farmers, dairymen, and graziers, and the annual production from the settlement will then probably exceed in value one million pounds sterling. All the State expenditure, therefore, that has been incurred in the scheme must be considered in relation to the many advantages to the community of this increased annual production. But there is another and still more important way in which the matter may be measured—in persons rather than in money. Amongst the settlers many are to be found with large families. A number of the witnesses who gave evidence before the Board had families ranging from six to ten children. Allowing, however, for average families of three children, the Upper Burnett and Callide lands will directly support 7,500 people.

Now for every £1,000,000 of wealth produced from the land, it may be said, as a wide generalisation, that about one-third will find its way into the pockets of the producers, while two-thirds, as costs of production and general expenses, will be distributed amongst the community. Therefore, besides the 7,500 people maintained on the land, the distributed wealth will support a further 15,000 people, making 22,500 people all told. Such is the value of this settlement scheme to Queensland.

Much is heard from time to time of progressive settlement schemes in Western Australia. It is surprising how ready some people are to make comparisons to the detriment of Queensland, while lacking even elementary knowledge of the subject being dealt with. For the information of those who like comparisons the Board reproduces in Appendix A of the Report, an analysis of group settlements in Western Australia which appeared in the "London Times" of the 14th September last and which has since been verified.

Having discussed the matter in this general way, the Board proceeds to give particulars of its inquiry and to state in detail the conclusions it has reached regarding the future administration of the Upper Burnett and Callide Valley settlement.

## Soil and Climate.

The opinion of the Board is that the Upper Burnett and Callide Valley lands are eminently adapted for a successful closer settlement scheme. The Report continues: Rich belts of country exist which bear comparison with anything to be found in other parts of Queensland, and, if closer settlement could not succeed on such an area, the outlook for increased primary production in Queensland would be dismal indeed. But it must be remembered that the country is, or a few years ago was, largely virgin land, and, therefore, many years of concentrated effort will be needed to put this settlement in the same developed and established condition as the older closer settled districts of the State, such as for instance the South Coast, the Brisbane Valley, or the Wondai-Kingaroy areas. The progress that has already been made, and the towns that have been established throughout the area, speak well for the energy and enterprise of the people, and, in the course of time, there is no reason to doubt that this great new district will compare favourably in prosperity with the other districts mentioned.

The climate of the settlement is invigorating and healthy. Sheltered from the humidity of the coast by the Burnett and Dawes Ranges, the winds that come in from the Pacific are dry and keen. The winters are not unduly severe. The average annual rainfall, taken from official records at places scattered throughout the area, is about 29 inches.

The Upper Burnett and Callide Valley are served by the Burnett River, and many large creeks. On the southern watershed there are Splinter, Three Moon, Monal, Boogolgopal, Cattle, Trevethan, Small's, and other creeks, and the Rawbelle or Nogo River. On the northern watershed the creeks are Grevillea, Kariboe, Kroombit, Callide, and Bell. These creeks drain an extensive area of country, and in heavy rains the water overflows the banks and inundates the adjacent flat country. In places there is a considerable current.

The years 1927 and 1928, and the early part of the current year, were exceptionally wet. In consequence floods were more severe than usual, and much damage was done on the rich alluvial flats adjacent to the creeks. In average years the great bulk of the rich agricultural land in the district may be cultivated without losses by flood.

## Products, Markets, and Prices.

The land is capable of producing many and varied products such as different kinds of crops, cream, pigs, and fat stock. For the present cream and cotton are the principal products. The problems of marketing the products from the area are no different from the general problems of marketing which face all primary production in the State. They are not, therefore, specifically referred to in the

PLATE 20.—RINGBARKED RIDGES BETWEEN WARATAH AND KOLONGA, UPPER BURNETT.
Showing the extent of sweet grazing country.

PLATE 21.—HEREFORD CATTLE HOCK-DEEP IN LUSH PASTURE, PARISH OF GREVILLEA, CALLIDE VALLEY.

PLATE 22.—FIRST-CLASS CULTIVATION LAND, CANIA ROAD, UPPER BURNETT.

"Rich belts of country exist which bear comparison with anything to be found in other parts of Queensland, and, if closer settlement could not succeed in the Upper Burnett and Callide, the outlook for increased primary production in Queensland would be dismal indeed."

PLATE 23.—A WEALTH OF NATURAL GRASS, PARISH OF GREVILLEA (THIRD SECTION).

Report. The Upper Burnett and Callide Valley and neighbouring districts are specially suited for the production of cotton. In fact they are the chief cotton producing centres of Queensland and Australia. What is the value of the cotton industry to Queensland, and is it worth establishing as an integral part of the life of the State? The Cotton Board answers this query with the following comment:—

> "Already this young industry is playing an important part in the life of the community. With the production of slightly over 12,000,000 lb. of seed cotton in the 1928 season, more than 4,000 pickers were employed, exclusive of family labour. The wages bill is a big one. The payment to the railways for transport charges was approximately £8,000. Further moneys have been paid in connection with the handling of lint for export, and the ginneries and oil mills of the British Australian Cotton Association employed during the season about 120 employees. In addition, this company pays away other large sums of money for cartage, handling, and shipping charges on cake and oil. In the face of these facts it is easy to visualise the very great influence for good which an extensive cotton industry would have on the community in general.
>
> "A quadrupling of the present crop is possible within a very short space of time. This increase in the crop, however, can only be brought about by sales of lint to Australian spinners. This would mean an additional annual income of £600,000. The effect of this increased wealth upon the relieving of unemployment and upon the important national questions of development and migration is difficult to measure.
>
> "If the industry is worth establishing, and this we contend is unquestionable, then due regard must be had to the fact that adequate assistance is necessary during the experimental stage. When one has regard to the fact that the American industry has been in existence 100 years, it is obvious that the Australian industry, which has only been in existence a few short years, has not yet emerged from the experimental stage."

For the Callide Valley the matter of the survival of the cotton industry is of great importance. The foundation of that district, much more so than the Upper Burnett, was based on the growing of cotton. Cotton originally attracted most of the settlers to the land. Cotton kept them going. Cotton established the towns of Biloela and Thangool. Cotton growing, as an industry, must surely and quickly decline unless means can be found to stabilise prices, and ensure a reasonable return to the grower.

Various proposals have been submitted to the Commonwealth Government by the Queensland Cotton Board and by cotton manufacturers to help the growing and manufacturing industries over the difficulties with which they are faced, due to competition from overseas. These proposals may be summarised as follows:—

(*a*) Duty on raw cotton and linters to be imposed so as to ensure the purchase of the Australian article by spinners.
(*b*) Deferred duty on cotton yarn to be made effective.
(*c*) Duty on cotton wadding and oils to be increased.
(*d*) Bounty to be given on percentage yarn.
(*e*) Bounty on cotton yarn to be increased.

The Commonwealth Tariff Board has inquired into these matters, and has reported thereon to the Commonwealth Government, which now has them under consideration.

## General Administration.

Matters of general administration in regard to the settlement are discussed in the Report under the following main headings:—

(1) Sound Settlement Areas.
(2) Additional Areas for Settlers.
(3) Capital Values and Rents.
(4) Freehold Tenure *v.* Perpetual Lease.
(5) Water Facilities for Settlers.
(6) Roads and Bridges.
(7) Operations of the Agricultural Bank.
(8) Immigration Settlement.
(9) Prickly-pear Land.
(10) Departmental Organisation.

Altogether the Report is one of the most useful ever presented on land settlement in Queensland.

Plate 24.—Pastures that have never been Furrowed (growth of Natural Grass, Callide Valley).

Plate 25.—Extensive Flats, Parish of Grevillea (Third Section).

The Third Section has not yet been made available for settlement.

"Judged on the basis laid down recently by the British Economic Mission, the Upper Burnett and Callide Valley Settlement Scheme may be regarded as a sound State investment. Indirectly, it will return interest and redemption manifold."

PLATE 26.—A PROSPEROUS TOWN IN THE MAKING (THE MAIN STREET, BILOELA).

PLATE 27.—A BUSY CORNER OF THE MAIN STREET, BILOELA.

"The progress that has already been made, and the towns that have been established throughout the area, speak well for the energy and enterprise of the people, and, in the course of time, there is no reason to doubt that this great new district will compare favourably in prosperity with the older closer settled districts of the State."

Plate 28.—Bridge over Three-Moon Creek, near Monto, Upper Burnett.

"With the advent of closer settlement entirely new roads had to be constructed to serve the new subdivisions and enable the settlers to get their products to the railway. New bridges, causeways, and crossings were also needed. Whereas, formerly, it was of little economic importance if a cattle grazier were isolated for a few weeks owing to the state of the roads and crossings, it is necessary under the altered settlement conditions that settlers should have daily, or almost daily, communication with the railway."

Plate 29.—Kroombit Creek Bridge under Construction, Callide Valley.

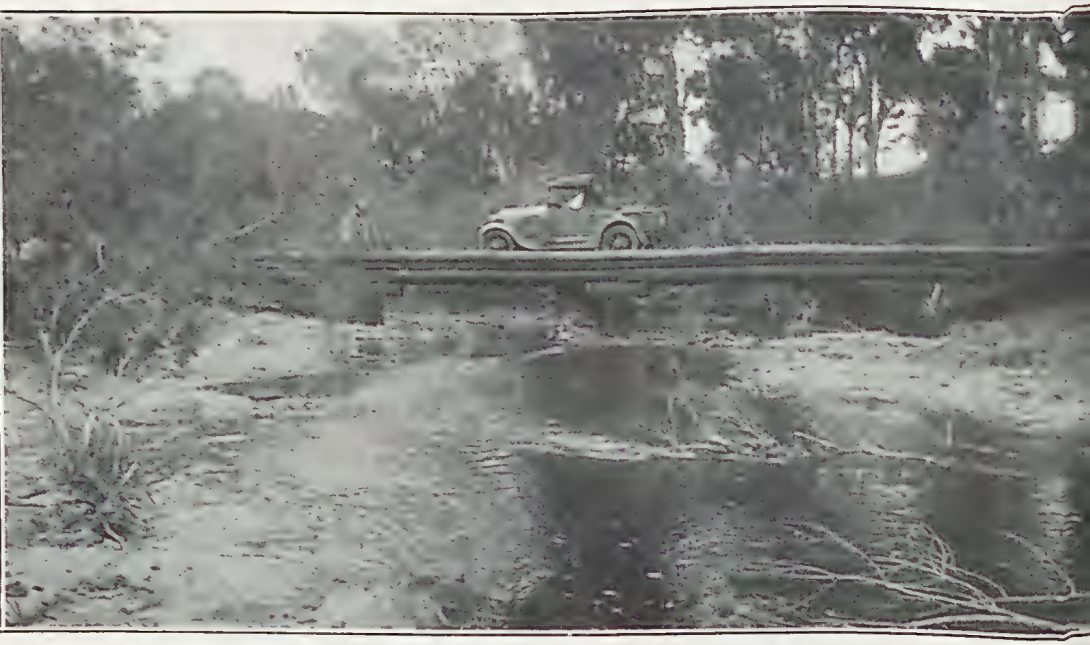

PLATE 30.—MACK'S CROSSING, MONAL CREEK, NEAR MONTO, UPPER BURNETT.

PLATE 31.—ROAD THROUGH SCRUB COUNTRY NEAR THANGOOL, CALLIDE VALLEY.

"As part of the settlement scheme, the Department undertook to construct, free of cost to the Local Authorities, the necessary roads and bridges to give pioneer access to each holding. The present standard of work which is done with the aid of modern plant is quite satisfactory, and settlers are being provided with reasonably good roads. The bridges throughout the area, constructed by the Lands Department, are first-class structures."

Plate 32.—Section of Road between Monto and Splinter Creek, Upper Burnett.

Plate 33.—Another View of the Road from Monto to Splinter Creek, Upper Burnett

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING MAY, 1929, AND 1928, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | May. | No. of Years' Records. | May, 1929. | May, 1928. | | May. | No. of Years' Records. | May, 1929. | May, 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | | | | |
| Atherton .. .. | 1·91 | 28 | 1·29 | 1·03 | Nambour .. .. | 4·81 | 33 | 0·72 | 2·97 |
| Cairns .. .. | 4·37 | 47 | 1·96 | 2·38 | Nanango .. .. | 1·50 | 47 | 0 | 0·94 |
| Cardwell .. .. | 3·48 | 57 | 1·61 | 1·74 | Rockhampton .. | 1·43 | 42 | 0 | 0·11 |
| Cooktown .. .. | 2·88 | 53 | 0·76 | 0·62 | Woodford .. .. | 2·87 | 42 | 0·44 | 2·57 |
| Herberton .. .. | 1·59 | 42 | 0·81 | 0·54 | | | | | |
| Ingham .. .. | 3·31 | 37 | 0·76 | 1·17 | | | | | |
| Innisfail .. .. | 12·22 | 48 | 3·77 | 9·07 | | | | | |
| Mossman .. .. | 3·38 | 16 | 2·36 | 1·37 | *Darling Downs.* | | | | |
| Townsville .. .. | 1·28 | 58 | 0 | 0 | | | | | |
| | | | | | Dalby .. .. | 1·31 | 59 | 0·12 | 0·88 |
| | | | | | Emu Vale .. .. | 1·12 | 33 | 0·31 | 0·64 |
| *Central Coast.* | | | | | Jimbour .. .. | 1·20 | 41 | 0·03 | 1·43 |
| | | | | | Miles .. .. | 1·49 | 44 | 0 | 0·74 |
| Ayr .. .. | 1·08 | 42 | 0 | 0 | Stanthorpe .. .. | 1·87 | 56 | 0·23 | 1·38 |
| Bowen .. .. | 1·26 | 58 | 0 | 0 | Toowoomba .. | 2·17 | 57 | 0·05 | 1·79 |
| Charters Towers .. | 0·75 | 47 | 0 | 0 | Warwick .. .. | 1·54 | 64 | 0·09 | 0·95 |
| Mackay .. .. | 3·73 | 58 | 0·34 | 2·43 | | | | | |
| Proserpine .. .. | 4·34 | 26 | 1·06 | 1·23 | | | | | |
| St. Lawrence .. .. | 1·74 | 58 | 0 | 0·19 | *Maranoa.* | | | | |
| | | | | | Roma .. . | 1·43 | 55 | 0 | 0·40 |
| *South Coast.* | | | | | | | | | |
| | | | | | | | | | |
| Biggenden .. .. | 1·76 | 30 | 0 | 1·71 | | | | | |
| Bundaberg .. .. | 2·66 | 46 | 0·31 | 0·86 | *State Farms, &c.* | | | | |
| Brisbane .. .. | 2·77 | 78 | 0·42 | 1·82 | | | | | |
| Caboolture .. .. | 2·82 | 42 | 0·47 | 1·67 | Bungeworgorai .. | 0·83 | 14 | 0 | 0·42 |
| Childers .. .. | 2·15 | 34 | 0·22 | 0·98 | Gatton College .. | 1·60 | 29 | 0·07 | 1·36 |
| Crohamhurst .. | 4·86 | 35 | 0·89 | 4·12 | Gindie .. .. | 0·92 | 29 | 0 | 0·00 |
| Esk .. .. | 1·98 | 42 | 0·14 | 2·19 | Hermitage .. .. | 1·18 | 22 | 0·09 | 0·65 |
| Gayndah .. .. | 1·52 | 58 | 0 | 0·09 | Kairi .. .. | 1·77 | 14 | 0·50 | 1·52 |
| Gympie .. .. | 2·90 | 59 | 0·12 | 2·14 | Mackay Sugar Experiment Station .. | 3·28 | 31 | 0·35 | 2·03 |
| Kilkivan .. .. | 1·84 | 50 | 0 | 0·82 | Warren .. .. | 0·89 | 14 | 0 | .. |
| Maryborough .. | 3·10 | 57 | 0·25 | 1·16 | | | | | |

GEORGE G. BOND,
Divisional Meteorologist.

14th June, 1929.

## QUEENSLAND SHOW DATES, 1929.

Townsville: 9th to 11th July.
Woodford: 11th and 12th July.
Home Hill: 12th and 13th July.
Samford: Postponed.
Woombye: 12th and 13th July.
Charters Towers: 17th and 18th July.
Ingham: 19th and 20th July.
Caboolture: 18th and 19th July.
Rosewood: 19th and 20th July.
Ithaca: 20th July.
Laidley: 24th and 25th July.
Nambour: 24th and 25th July.
Ayr: 26th and 27th July.
Barcaldine: 30th and 31st July.
Maleny: 31st July and 1st August.
Bowen: 31st July and 1st August.
Nundah: 3rd August.
Redcliffe: 9th and 10th August.
Royal National: 12th to 17th August.
Crow's Nest: 21st and 22nd August.
Wynnum: 30th and 31st August.
Goombungee: 30th August.
Imbil: 4th and 5th September.
Zillmere: 7th September.
Stephens: 14th September.
Malanda: 18th and 19th September.
Pomona: 18th and 19th September.
Beenleigh: 20th and 21st September.
Rocklea: 28th September.
Kenilworth: 28th September.
Enoggera: 5th October.
Pine Rivers: 15th and 16th November.

# CATTLE BREEDING AND MANAGEMENT.

By H. ANNING, Wetherby, via Richmond, Queensland.*

The question of what kind of property to buy is naturally the most important one. The most necessary requirement is good, well-watered country, and how to distinguish good country from bad often puzzles experienced men. It is advisable to shy off country which gets too big a rainfall, as grass is rank and sour there as a rule. Swampy country is bad, as it is a breeding-ground for ticks. It is best to inspect in the off season, say, in August or September, before the storms have started. If cattle are in fair condition then, and appear to be able to hang on for three or four months before losses commence, the country should be all right.

On good country cattle run in big mobs; that is always something to go on. On poor country they split up into twos and threes, and look like kangaroo dogs. Those on the main frontages and camps tell the most eloquent tale. Outside cattle are always in good condition, because they have the country all to themselves. Algy should take particular notice, when riding along the main creeks, of the condition of cattle fringing the big waterholes. The old cows, with young calves at foot, will naturally look the worst. If they are in fair, strong condition, and calves appear well nourished, the rest may be taken for granted. If he be an observant young man, that is the time to pick the camps, because it is the time of year that cattle come in regularly and early, and spend a great part of the day on the camps they choose for themselves.

Coastal country is often good, if the creeks run up to rangy country. Being well drained, they often open out into deep valleys, with little pockets in the ranges composed of black soil plains and flats. These sometimes grow a little Flinders grass, and a rough, course species of Mitchell. Unfortunately—as is generally the case—the further away one gets from the coast the lighter the rainfall. Country gets sweeter, but water gets scarce, and it doesn't pay to have to pump water for cattle —yet. Of course, that kind of country is all right for the early part of the season, but cattle must be shifted when it gets dry. There is any quantity of beautiful downs country to be had for a song, but all the water must be obtained by boring, and raised by windmills and engines, and this does not pay, especially when the cost of boring and equipment is heavy. It is better to put up with inferior country, where the seasons are more reliable and Nature attends to the watering.

## The Outback Station.

The question of locality must be carefully considered. If right away out "where the tall gum trees grow, &c.," rents will be low, probably not more than 2s. 6d. per mile. Everything in the nature of stores, saddlery, fencing wire, will be at famine prices. Road carriage will be fearfully high likewise, and most unreliable. The cost of regular drafts of bulls will be something to remember with a shudder. However, as aforesaid, there are compensations. Labour will be cheap and plentiful. A squatter can rent 2,000 square miles of country, and make use of 10,000 if he wants it. There are no rates or taxes, and this is something to be thankful for. A lot can be done with greenhide, which takes the place of leather. Men in those far-out localities are very self-reliant and resourceful. They do all their own saddle repairs, make pack saddles and bags out of greenhide, and look after what they have made very carefully. Hopples and ropes, of course, are made out of the same material.

Salt can be gathered and bagged in hundreds of tons from salt water arms, after high tides have receded and the water evaporated. The salt—though not as good as the refined article—is quite good enough, and most useful to put out for the cattle on the different camps. Some people nail hides around trees, with the fleshy side outwards and the hairy in, and after filling them with salt, nail the upper portions into the trees above. Rain causes the salt to work through the hide, and cattle come on to the camps and lick it. Finally, they tear the hides away to get at the salt. Where salt is plentiful, however, it is best to give the cattle all they want in big troughs. There is nothing better to break cattle into camps, I consider, although I know some good cattlemen condemn it.

## The Heads of the Herd.

The greatest drawback to outback stations is, of course, the trouble and expense of getting bulls up when needed. It doesn't pay to get small annual drafts. One way of getting over this is to buy some pure-blooded bulls, and start a small stud. Good cattlemen have tried this and come to grief, but I knew one man who made a brilliant success of it. He used to buy first-class bulls, giving up to 200 guineas

* In the "Pastoral Review" for April and May.

for them. Then he paid a fancy price to the owner of some good herd to allow him to go right through the herd and pick 200 to 300 heifers. After their calves had been branded and culled, he used to go through the young bulls at twelve months old, and cull out anything again which wasn't developing as he liked. Eventually he used to keep about 60 per cent. of the male drop as bulls, and put these into the herd at two years old. The rest he shot. The heifers he sold. He never bred from the progeny. Every few years he disposed of what was left of the stud, and started up again an entirely fresh lot. In this way he avoided inbreeding.

He was most particular about constitution, ruthlessly sacrificing anything savouring of the slightest weakness. He had a decent herd, and a definite type of bullock, suitable to the country, was produced. Of course, the knife was used freely on the station breeders as well. This method saves a lot of expense, but it requires an experienced man to carry it out properly, and Algy would perhaps be well advised to spend more and get his bulls from some good stud.

It may be assumed that after several inspections Algy is eventually suited with a property. Suppose he purchases, pays a deposit, and makes arrangements to take delivery by means of a bang tail muster, to commence as soon as the wet season is over. Then he is all set, and is about to see something which will remain in his memory for many years to come. There are two advantages in buying by bang tail muster. A man only pays for what are delivered, and he also has an opportunity of classifying his herd as they run through the yards, and the opportunity should not be missed.

Of course, the herd is badly knocked about on an unfenced run. Cattle are driven long distances, and the same cattle are driven and handled over and over again, but once it is over they can be given a good spell, and if the new owner is lucky enough to get rain they soon recover. Buying on the "walk-in-walk-out" principle is not to be recommended, since numbers are often over-estimated (by the vendors), and it is best to be quite sure of what one is purchasing.

### The Business Side.

There are about 12,000,000 cattle in Australia (or rather there were in 1926). . . In the Northern Territory, most parts of Queensland, and the northern portion of Western Australia the cattle game hasn't paid since 1921. It used to cost about 30s. a head to breed and fatten a bullock in the old days. Now it costs about £6 10s. In ancient times squatters were glad to get £2 10s. for a big fat bullock, and good careful managers made fair incomes then. £1,000 a year was considered a princely income in those days. To-day fat beef is worth 24s. per 100 lb. or thereabouts at northern works. Droving and trucking have to come out of that, and this costs about 30s. per head for bullocks fattened in the Gulf, so that there is no margin for profit yet. Fat beef must rise to 30s. per 100 locally before cattlemen can reckon on a fair profit. The man with 10,000 cattle can then reckon on an income of some £2,000 a year.

Unfortunately herds have depreciated so much in numbers and quality, owing to the lack of markets, rounded off with the horrible drought, that future profits will be largely eaten up in payments of interest and restocking. When cattle do really rise to a good payable price—say, £2 per 100 lb.—most of the existing owners will jump at the chance to sell out, just as they did after the long depression prior to and in the terrible drought of 1902. People buying in now will reap the benefit. All indications point to a good market in the future, and when the tide turns, old-timers will be foolish to sacrifice their holdings.

### Getting a Bit o' Country.

In the case of any young man wishing to invest, he must choose between a large area of country, out beyond the rim, with a big neglected herd (probably), or a nice compact little property in a nice district handy to the rail, a well-broken-in herd of good cattle, and, generally speaking, every comfort and convenience. He can estimate to a penny almost what he can make out of such a place, but, of course, there is no chance of expansion. A young man, with a strong constitution, plenty of pluck, determination, and perseverance, I should advise to get well out, and buy a large herd, even if it is badly neglected, and overrun with rowdy bullocks.

Of course, it is advisable to get decent country, well watered naturally. The advantages of buying this way are, that first the place can be bought cheaply, and it is quite possible to resurrect any herd. Labour will be cheap, since abo. stockmen will be plentiful, and, properly and tactfully worked, they are real good men. I will admit they are hard to understand and work, and one must put up with a lot, but in open unfenced country they are indispensable in some respects. Tracking is to them something so natural that they cannot understand anyone not being able

to read, interpret, and follow tracts. Of course, the disadvantages of such a property are obvious enough. Markets will be far distant, but the extra cost of droving is compensated for by the lessened cost of breeding and fattening, while one does not suffer to the same extent from droughts. Apart from all other considerations, a few years spent by a young man under the conditions outlined do him a lot of good, and the experience is a most interesting one to look back upon. If the young man is a novice, it will, of course, pay him to get a good head stockman, and the type to avoid like poison is the "galloping musterer."

### The Rowdy Herd.

Now assume he purchases a piece of country, with a herd of 15,000 cattle. There are no fences, and few yards or other improvements. The cattle have been worked on no particular plan or sytsem. Sometimes they are worked up the creek, other times down, and always rounded up on different camps to be cut out. Naturally the poor unfortunate creatures look on man as their natural enemy, and it takes a lot of hard galloping and swearing to steady a mob after it has been sighted. Often they are not sighted; the cattle hearing them come start off at full gallop, and stockmen must race along the tracks to come up with them.

Hereinafter the buyer will be called Algy for short. Algy's first objective is to steady the cattle, break them properly into camp, and always work them the same way. The work of transforming that herd into a quiet one is not going to be done in a day. By going carefully and systematically to work it can be done thoroughly in about five years.

### A First Essential.

In all probability Algy will discover there are two main branding yards, about 40 miles or so apart, and a few broken-down tailing yards. The cattle have always been driven great distances to get to a yard. One of the first essentials is to build a chain of tailing yards and small branding yards, and alongside the latter build paddocks, about two miles square, with three strong barbed wires to hold weaners. The branding yards can be built for £100. The tailing yards are best built of posts, three barbed wires, and a top rail. They should be large, say 100 yards square, and placed on soft sites, with some shade trees enclosed. This gives the cattle plenty of room to spread out and lie down.

Branding yards should be built on main creeks, about 15 miles apart. Wherever there is a good permanent waterhole, a soft shady camp on the bank of the creek, and good grass a little way out on both sides, that is a good place to form a camp, build a branding yard, and small paddock. Branding yards should be strong, and built to a proper plan, so that cattle will run well. I have seen a lot of money spent on yards in which cattle had to be badly knocked about to draft, and others in which they ran through like quicksilver. Yards had best be planned by old experienced cattlemen, since a panel too many in a lane makes all the difference to cattle running freely; also the yard should be planned so that cattle work back towards their feeding ground. A chain of substantial yards built along the main creeks and camps need not cost a great deal, and they are indispensable.

### Choosing Camps.

The question of choosing camps is most important, since once picked the camp should never be changed. It should be soft, well shaded, and with a good open "face." Superfluous trees can be cut down and burnt. It should be big enough to hold from 1,200, to 1,500 cattle; it is not advisable to put on more cattle than that at once. Another little patch of trees, close handy, does to put "the cut."

Now that is the camp, and it is chosen chiefly because cattle have already demonstrated their affection for it. It is a good thing to buy a few tons of rock salt, and always have some on the camp, especially just before a muster. That increases the attraction. In time to come cattle will make naturally for the camp as soon as they are started up, and take very little holding while cutting out goes on. All this makes ultimately for economical and efficient working. Also, as already pointed out, they get contented and quiet, and cease to regard man as their natural enemy.

The sooner camps are picked, yards built, and the work of breaking cattle in commences, the better. The first year very little improvement can be expected, and Algy will find mustering to be hard uphill work, but assuming that 4,000 weaners have been taken from their mothers before the end of the season and herded in four separate mobs for a month or five weeks by men understanding their work, those weaners will remember the experience, and help instruct the older cattle. They themselves will be no trouble to work the following year, and as bullocks will be good on the road. Weaning regularly and herding soon tells a tale.

# THE MAKING OF A CAMP HORSE.

By "CULKAH."*

What a big part in the busy cattle man's life the camp horse plays! Yet he or she (because many mares are just as smart and brainy as t'other) are to-day treated in a fashion that must make the old-time camp rider turn in his grave.

Years agone the camp horse held pride of place, was led to the cattle camp, did his arduous work, got a rub down, and was let go. Not from him or her was the extra work of yarding asked. Moreover, those brainy equine workers knew well what was their legitimate job, and objected, in some instances very plainly, to what they considered extra work, or work that was really quite beneath their dignity.

Yea, camp horse knew his worth, and the old riders knew his worth, therefore some wonder horses lived in the year gone past.

As a brainy boxer will conserve his strength through a gruelling mill, so will the rider and horse that know one another and are on intimate terms see a lot of work put through with minimum effort. Times out of number both horse and rider seize the psychological moment and bluff a beast out before it knows where it is. For the love of Mike don't harass a beast more than is necessary. Give it a chance to see there are other cattle out to bear it company. But we're a bit ahead of the job.

Let's imagine the camp is on, and your hands know their place. The best of 'em are on the face of the camp. All set. A chance occurs, and you can wangle out four or five "not wanteds" together. Take it, by all means, take it. 'Twill save much galloping. Or maybe there's an old matron or so that cares not where she be so long as the infant is with her. Diddle these out quickly as a start.

Good men round that camp will make a mort o' difference. Some chaps without thought will bung in and root the cattle out until they get a ragged edge on their tempers, and they'll do their darndest to give you trouble. Likewise some camp riders will stir up cattle, trot through 'em, and do sundry other uneducated stunts that don't belong to the job. The camp rider that knows his job will insinuate himself in amongst that camp with little more effort than nothing and barely disturb the position.

Too truly there may be some beast of either sex who was born to make trouble, and this lady or gent, as the case may be, will rudely gallop or shoulder its way through your otherwise orderly camp, and stir up some dust. Leave it be, lad. There'll come a time during the play when you get a brilliant chance, and the old wise camp horse knows it just as well as his rider. On that occasion, maybe, 'tis excusable if you bust that refractory skullion out pronto, and show him or her just what you and old Spanish have up your respective sleeves.

Spanish recalls to my memory hard days on the Hodgson and Roper. A brainy old chestnut whom you must needs ride with the girth and 'cingle a-swinging free, and the crupper was all you needed to kerb the good Hemsworth poley all jake. Round about 1895 there were few Anglo-Australian saddles, and out on a big Territory run I happened to own a Gaydon poley. Good horseman Tom Perry rode a clever camp horse known as Ivo in this, and 'twas odds on a fall several times; this is always a possibility until you learn to use the poley.

By the way, 'tis a bad habit to cultivate—that of dropping your hands on the camp horse's neck. It is generally done when the rider is getting a shade weary; likewise camp horse is weary, and he takes it as a signal for a full stop. Maybe the pace is up, and to stop old camp horse has to do a straight up and down prop, dig his toes in, and that bit of leather acts as a catpult—neither comfortable nor graceful, I assure you.

Just a word on camp drafts, as they are termed. Sure, many get a lot of fun out of camp drafting, but from the camp horse's view, and the rider's too, 'tis all skew-whiff. The beast is put out, steered maybe between two posts all O.K., gets a certain distance, and then this horse, that has been taught to put a beast out, is asked to bring it back; then before the two bewildered animals realise what is required of them, tingle-tingle goes the bell. Not a dinkum camp horse's work, I'd say, but just a handy horse on the face of a camp. More in his line.

Well, to see the whole show of camp horse's work you must attend many cattle camps, and draft all manner of beasties, and as the crowd can't get that show, no doubt the camp drafting competitions are all O.K.

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* In the "Pastoral Review" for June.

# NATIVE GRASSES AND OTHER FODDERS.

By CHAS. McGRATH, Chief Supervisor of Dairying.*

Queensland possesses an extensive variety of nutritious native grasses, a number of which are noted for their drought-resisting character.

Nutritious herbage and edible shrubs, in conjunction with some 164 species of grass, constitute a natural pasturage that attracted the attention of stock breeders in the early stages of settlement and has placed this State in a prominent position among live stock countries of the world.

There is evidence, however, that the carrying capacity of our native grasses and fodder plants has greatly diminished over a period of many years.

Writings and statements of the early settlers in many parts of the State give us an idea of the wonderful growth of grasses high enough to conceal a flock of sheep, and in some localities of such a height that would allow of its being tied over a horse's back.

In a season such as the present some idea of the luxurious growth of the original native pastures may be formed from a view of the stand of native grass in railway enclosures, where they have been protected from the devastating effects of overstocking. From a glance at the areas outside the railway fences it is evident that many of the excellent varieties of grasses that once formed part of a rich, native pasture have entirely disappeared.

This serious deterioration that our native pastures are undergoing is attributable to a number of causes, the chief of which are overstocking, droughts, indiscriminate burning off by occupiers, and by bush fires.

Spasmodic cultivation has been responsible for the destruction of valuable grasses and has assisted the spread of harmful weeds. Fortunately this State has been spared the ravages of rabbits.

The preservation and improvement of our native pastures is a matter of vital importance, for on the vast fertile areas of this State will be raised the live stock required to meet the increasing food requirements of the Commonwealth and to maintain the flocks of sheep, including the high-class merino, that supply our own and oversea markets with the high quality wool that has become world famous.

To augment declining native pastures and to convert ungrassed areas into pasture areas a number of grasses have been introduced into the closer-settled portions of the State.

With the development of the dairying industry, extensive areas of what was once jungle-covered country have been converted into rich pastures for dairy stock, thereby materially increasing the meadowland of the State.

In some cases crops are grown for one or more years after the burn, while in many instances the land was seeded with grasses after the burn.

The grasses chiefly grown are Paspalum dilitatum, Rhodes, Kikuyu, and Prairie. Conditions that favoured the growth of one or more of these grasses exist in large areas on the coastal tableland and Downs portions of this State.

In the more northern portions Panicum muticum grass is also grown successfully, being favoured with a liberal rainfall.

The area under introduced grasses is approximately 546,575 acres.

The value of pasturage native and introduced cannot be too strongly stressed, as it is an all-important factor in our live stock industries and has a direct bearing on the economical production of meats, wool, dairy, and subsidiary products.

The harvesting of pastures and fodder crops by the animals lowers the cost of production, and suitable mixed pasture is a class of food that appeals to the appetites of the animals and encourages maximum yields.

The splendid crop of native pasture throughout the present season is reflected in the increased output of dairy products, and the results of the work of the herd recording officers disclose an increase in the average production per cow.

It would be difficult to over-estimate the value of our native grasses, fodder plants, and introduced grasses as harvested by the dairy cows.

In the economic harvesting of pasture and its conversion into condensed forms of nutritious food for human consumption the dairy cow stands pre-eminent amongst live stock.

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* From a radio lecture through 4QG.

The beneficial influence of succulent native pastures on the quality of our butter was mentioned by Professor Hunziker when referring to the delicate, full, natural flavour and aroma of our high-grade product.

A reference to statistical records shows a rapid development in the dairy industry in this State.

Upwards of 22,500 persons are located on dairy farms and co-operatively own and operate fifty-two butter and seventy-three cheese factories. The amount of capital invested in the industry is approximately £35,000,000, and upwards of 90,000 persons, or 10 per cent. of the population of the State, are dependent on the industry for a livelihood, which gives a yearly return of a value of approximately 7,500,000 sterling.

As large areas of Crown lands suitable for dairy farming still await settlement, the expansion of the industry in the coming years will exceed that of recent years.

The production per dairy cow varies greatly with breed, individuality, locality, quantity, and quality of pasture and food available, and there is evidence that the quality and quantity of pasturage and food available on dairy farms has a great influence on the returns from our dairy herds.

On many dairy farms native pasturage has so deteriorated that it is necessary to reintroduce suitable grasses to increase the grazing capacity of the holdings; which, together with the conservation of fodder, will prove a factor that will allow the dairy cow to yield to her full capacity and thereby increase the average yearly yield per cow.

Large areas in the coastal belt consisting of scrub-covered flats and hills, open fertile flats and forest ridges, with a rainfall of 30 inches and upwards, remain to be brought under closely-settled conditions. The grassing of scrub-covered and other suitable areas with pasture grasses such as Paspalum dilatatum, Rhodes, Kikuyu, couch, and Panicum muticum grasses is work that awaits the pioneer.

Large areas of rich scrub alluvial and forest soils are met with on tablelands and inner Downs areas.

A variety of fodder crops can be grown on such areas as well as on the coastal belts.

Considerable areas of lands suitable for the growth of lucerne also exist, and a stand of this valuable fodder should be established on every dairy farm where conditions permit of its growth.

Development of the dairying industry along efficient lines such as the breeding of high-class stock, production recording, conservation, and top dressing of pastures must receive our serious consideration.

The future prosperity of this State is chiefly dependent upon the successful development of the meat, wool, and dairy industries. The economics of these industries are closely associated with the maintenance and improvement of native pastures, the conversion of further areas into meadow lands, and the growth and conservation of stock foods.

Considering the importance of such industries to the welfare of the State, an appeal to graziers and sheep and dairy farmers to conserve and improve the pasture areas of the State should not be in vain.

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## AVOCADO PEARS.

The Avocado pear is one of the most nutritious and tasty sub-tropical salad and dessert food-fruits ever introduced into Queensland.

Secured direct from Professor Popenoe, of Berkeley University, San Francisco, on his arrival home from an eighteen months' tour of Mexico, Guatemala, and South America, there are growing on Mr. R. Walsh's place at Redcliffe, near Brisbane, fifteen selected named varieties from these countries, where this fruit forms the principal part of the food of the inhabitants. We are indebted to Mr. Walsh for the following note:—

"Avocado varieties vary in size, from a few ounces up to 3 lb. weight; they are grown on beautiful evergreen trees, and are from nearly round to pear shape. In colour the mature fruit ranges from light-yellowish green through dark-green to purplish-black—each fruit containing a single large seed, some tight in cavity, and others free. The flesh of the fruit is of a creamy, buttery, custard, nutty flavour, and in colour varies from pale-cream to deep golden-yellow, and just inside the skin a rich green tint. Several varieties ripen at different periods, and we hope to

have them maturing over many months of the year, when they must be hand-clipped from the tree—handled carefully, not bruised or pulled or knocked off—since the Avocado is ripened best off the tree.

"Composition and nutritive values are extraordinarily rich. Personally, I think them superb as a salad; alone, or in mixture, also eaten with pepper and salt, and with or without a biscuit. The wonderful nutty flavour lingers.

"The dietetic and nutritive values of the Avocado, as revealed by investigation and analysis at Berkeley University, show them rich in vitamins, and the digestion coefficient of Avocado fat (93.8) identical with the digestibility of butter-fat. . . . The matured ripe fruit is delicious, and has just recently been properly marketed in the big cities by the Californian Avocado Growers' Organisation—graded, selected fruit only, in attractive boxes, each containing one dozen, under the registered name of "Calavos," each fruit and box being stamped with this registered title. The demand absorbs the offerings, which in a few years are expected to be 5,000 to 6,000 boxes annually. (They can be grown to perfection in Queensland.)" Mr. Walsh has been good enough at different times to submit specimen boxes of his Avocados and also grape fruit to the Department, where they are recognised as being of excellent quality.

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## OPEN SEASON FOR OPOSSUMS.

### NATIVE BEARS ABSOLUTELY PROTECTED.

The Minister for Agriculture and Stock (Mr. H. F. Walker) made further reference recently to the intention of the Government to declare an open season for opossums extending from the 8th July to the 7th August next.

The Minister stated that he particularly wished to emphasise that the open season did not refer in any way to the koala or native bear, and this animal had been for some time receiving, and would continue to receive, absolute protection under the Animals and Birds Acts.

#### Cyanide and Searchlights Prohibited.

Trappers are warned that it is illegal for them to have in their possession, or use, cyanide for the purpose of poisoning opossums, and the use of flashlights and searchlights is also prohibited.

Arrangements have been made with the Commissioner of Police for the co-operation of his officers with this Department in preventing the violation of any of the provisions of the Acts which refer to the taking of fur skins.

Trappers holding permits have certain prescribed rights under the Acts, and they will be required to adhere strictly to the conditions under which the permit is issued. As a result of the activities of the rangers appointed under the Act and the Police officers, at least fifty prosecutions have been taken, or are pending, against persons who have engaged in the trapping of fur-bearing animals contrary to the Acts.

#### Sanctuaries Remain Strictly Closed.

No permit will be issued applying the trapper's rights to any sanctuary within the State. Additionally, owners of areas in excess of 2,560 acres are privileged, under the Acts, to reserve from the operations of trappers one-sixth of their total area for any specified purpose. All areas under 2,560 acres are exempt from the operations of trappers unless with the consent of the owner. The area now comprised within the sanctuaries in this State aggregates almost 2,000,000 acres, and the native fauna in this area is totally protected.

#### The Sawfly and Opossum—An Interesting Experiment.

The Minister added that a deputation of pastoralists had represented to him that the opossum was of considerable advantage in keeping in check the sawfly pest, which was in evidence in some of the pastoral areas of this State where considerable losses of stock had periodically occurred. With a view of determining the efficacy of the opossum in restricting the ravages of this pest, the Minister had arranged that an area of approximately 400 square miles in the Maranoa district had been excluded from opossum-trapping operations. The area which will be utilised for the purpose of this experiment will be kept under close observation by officers of this Department, who will, from time to time, furnish reports as to the influence of the opossum in checking the depredatory work of the sawfly.

## QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Bat's Wing Coral Tree (*Erythrina vespertilio*) is not confined to the scrubs or rain forests, but is also common in the open forests. It is a very widely distributed tree in coastal and inland parts of Queensland, and extends into the Northern Territory. The trees are sometimes known as Cork-wood. On the larger trees the bark is rough. The accompanying field picture conveys a faithful impression of the peculiar markings or rough oblique ridges which are often seen on the large trees. The wood is soft and very light. The flowers are bright red in colour and fairly large.

*Photo.: W. D. Francis.*]

PLATE 34.—BAT'S WING CORAL TREE, *Erythrina vespertilio*, A TREE IN RAIN FOREST OF IMBIL.

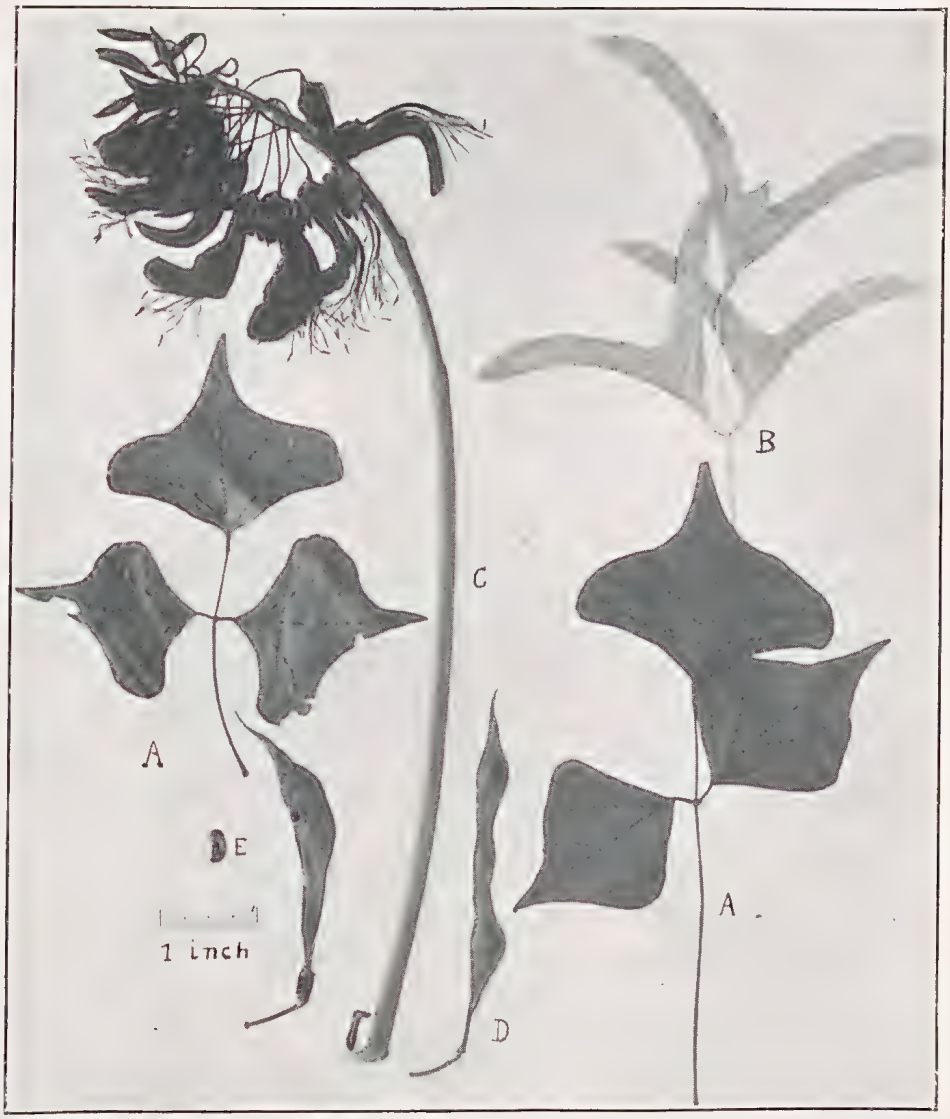


*Photo.: Dept. of Agriculture and Stock.*]

PLATE 35.—BAT'S WING CORAL TREE, *Erythrina vespertilio.*

A, leaves; B, leaf of the inland form of the species; C, inflorescence; D, pod; E, seed.

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**If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.**

# FARM TRACTORS.

By E. T. BROWN.*

Farm tractors have one, two, or four cylinders. The day may come when these power units are fitted with six and eight-cylinder engines. More and more motor-cars are being built with an increased number of cylinders, and there is no gainsaying it that, within reason, the greater the number the more even the turning effort, or "torque" as it is called. A one-cylinder engine gives a very jerky movement. This is due to the fact that there is only one impulse stroke out of every four. The torque during the power stroke is at least eight times that of the torque during the one and a-half revolutions of the main shaft occasioned by the power stored by in the flywheel. Two and four-cylinder engines give one and two power strokes for every revolution of the main shaft. This naturally gives more even running, and, consequently, imposes less strain on the various working parts. Most tractor engines of two or more cylinders are constructed with the cylinders behind each other, on the line principle. It is possible, however, to arrange them differently. They may be V-shaped or horizontally opposed, but, as yet neither of these two types is common. The last mentioned gives particularly sweet and even running. In this case a two-way throw main shaft is employed, and the explosions therefore occur at regular intervals. This gives a perfect balance to the reciprocating parts. A four-cylinder straight engine may fire in one or two orders. Some fire 1, 3, 4, and 2—number one cylinder being the one next to the radiator or in front of the engine—or 1, 2, 4, and 3.

## Lubricating Systems.

The commonest form of lubrication is by what is known as the splash system. In this case the oil is fed automatically to the sump or base by the action of a pump. A dipper is attached to the lower part of each big end, and, as the piston moves up and down, a small quantity of oil is scooped up and flung—in the form of mist or fog—over the bearings and on to the walls of the cylinders. This is a simple and efficient method, for there is nothing to go wrong except the pump. A rotary form of pump is usually employed, and this is practically everlasting. In some cases the oil on its way to the sump is caused to pass through a glass tube placed in sight of the operator. It can be told instantly if the pump be defective. As has been mentioned previously, it is extremely difficult to vaporise the kerosene; therefore, a little remains in its liquid form. This travels past the pistons and passes into the sump, where it mixes with the lubricating oil. The oil is thus thinned, and it is for this reason that makers generally advise renewing the oil every day the tractor is at work. To overcome this difficulty an outside oil reservoir is sometimes fitted. By a system of pipes a definite quantity of oil is delivered to each bearing, the oil being forced by the action of a pump. When this system is employed a sight feed is always fitted, so that the driver can determine if the lubrication is being carried out properly. Any surplus oil given off from the bearings is drained off and passed out on to the ground.

## Cooling Systems.

Air cooling is efficient in the case of a rapidly moving engine, such as one fitted to a motor-cycle or an aeroplane, as the current of air passing over the cylinders is ample to dissipate the extra heat developed. But this system is not practical in the case of the tractor engine, which moves comparatively slowly at all times. Water is, therefore, the cooling agent universally employed. The upper part of each cylinder is enclosed in a jacket and water is caused to pass through it. A radiator—an arrangement of small tubes between an upper and lower reservoir—is fitted, and as the water becomes heated in the water jackets it passes into the radiator, where it is afforded an opportunity of losing its heat; hence cold water is constantly passing into the jackets. The circulation of the water may be carried out in one of two ways. A pump may be fitted, this generally being driven off the gears in the timing case. To ensure sufficient cooling a belt-driven fan is mounted behind the radiator, so that a large current of air is drawn between the tubes. The majority of tractor engines, however, are cooled on the thermo-syphon system, since the pump method is more costly and more likely to get out of order. In this case a natural law is made use of—namely, that hot water tends to rise and cold water tends to sink. As the water is heated in the jacket it rises through a pipe to the top of the radiator and cold water takes its place, while the hot water passes downwards through the radiator tubes and thus becomes cold again. Both systems are excellent. The pump system allows of a smaller quantity of water being used, because the circulation is more rapid, but the pump requires attention. The main advantage of the thermo-syphon system is that the circulation of the water is governed by the needs of the engine at the moment as it depends upon the amount of heat extracted from the cylinder walls.

* In the "Farmer and Settler."

# RURAL LIFE IN OTHER LANDS—II.

BY THE EDITOR.*

IN our last talk on this subject we made a rapid survey of some of the trends of agriculture in France. We saw in them some resemblance to present-day conditions of rural industry in Queensland, particularly in respect to the migration of country people to the city, which most of us, I think, recognise as a world-wide phenomenon. There are, however, some superficial thinkers amongst us who regard the extraordinary expansion of Brisbane and other cities and the relatively slow increase in rural population in this State as due entirely, or almost entirely, to a purely local set of circumstances, social and otherwise. In fact, the same idea is held to some extent in respect to Australia generally. A study of world-wide conditions of the agricultural industry, however, reveals to us that this rural exodus is going on in every civilised country. Particularly is this so in France.

## French Agriculture.

We have considered a few of the trends in French agriculture, with the idea of learning from them some lessons, or extracting some information that might be of use to us in the study, or in our appreciation of our own particular rural problems. We showed how adaptable the French farmer is to changing economic conditions; how, when the world market was flooded with wheat, he intensified livestock production; when he lost his wool market, he concentrated on meat production; and when, more recently, the world market was swamped with frozen beef, mutton, and pork, he turned his attention more intensely to dairying. Starting where we left off: The general trends in French agriculture at the outbreak of the war, to summarise them, were: Change from cereals to fodder crops; expansion of grasslands or pastures; a much more intense interest in animal husbandry; and, to some extent, the replacement of men by women on the farms. Just here I should like to pay a passing and very small tribute to the wonderful character of the women of rural France—the women of the peasant class as they are called. During the war they took the place of their men in the field, engaging in all sorts of hard manual labour. At the same time they carried on their domestic work, attended to their children, and kept their homes scrupulously clean; and throughout the whole heart-breaking time of stress and bereavement, showed a courage and a capacity for endurance that was most inspiring and compelled our reverent admiration.

## Development of Animal Husbandry.

The type of agriculture which developed from the general trends I have mentioned rendered France relatively independent of outside sources of supply as regards meat, of which only about 2 per cent. of the country's total requirements had to be imported.

Exportable surpluses of draught animals and cattle were produced and there was a net exportation of dairy products, although France imported more cheese than she shipped abroad. On the whole, trade in animals and animal products appeared as a credit item on the balance-sheet.

Cereals, particularly wheat and oats, were imported in very large quantities, but all things considered, before the war France was self-sufficient in regard to foodstuffs.

## The Effect of the World War.

The immediate effect of the world war was, primarily, an enormous depletion of the nation's man-power, and, secondarily the devastation of a large area, including some of the richest agricultural districts in the country.

The general effect of the war upon agriculture in France was to intensify each of the four general trends to which I have referred and which characterised the farming of the country when the lid blew off Europe in 1914. These effects influenced in a similar manner, though to a different degree, the 77 Departments outside the war zone, the 10 Departments occupied in whole or in part by war operations, and the 3 Departments of Alsace-Lorraine which were restored to France at the end of the war.

* In a radio lecturette through 4QG.

From the viewpoint of land utilisation, the return of Alsace-Lorraine had no appreciable effect on the agricultural situation in France. Generally speaking those provinces proved to be, what might be called a deficit region from an agricultural standpoint, for much of their primary produce had to be supplied from other parts of France, though against that was a fair proportion of root-cropped areas, grazing land, and forest country. All things considered, the acquisition of Alasce-Lorraine laid an added burden on the agricultural resources of the French nation.

In the reconstruction of French agriculture since 1919 the same difficulties were encountered as have been met with in every agricultural country. We are very familiar with the same economic difficulties in Queensland, but under a progressive—I might also say aggressive—rural policy in this State, we are doing much, in my opinion, to minimise them.

### Increased Demand for Meat.

An interesting fact is that, since the war, the demand for meat in the cities and other industrial centres has increased in France. Not only has there been an actual increase in the numbers of city dwellers—the official figures for 1925 show that there were nearly nineteen millions in the actual city populations of France; that doesn't include, of course, the populations of minor towns and villages that are purely rural—but after the war the ex-service men, who had acquired a taste for beef and mutton in the army, demanded more and better meat on their return to civil life. A higher wage scale also since the war has enabled industrial workers to establish a higher standard of living than was possible in 1914.

### Land Utilisation.

What impressed many of us who lived in France for some time was how the land is utilised in that country. Between the time of the French Revolution in 1790 and the middle of the last century, there had been a general expansion in agriculture. Lands that for centuries had lain unproductive as State lands or as parks and pleasure grounds of large private estates were put into cultivation. Even extensive tracts of forests were felled and the soil ploughed. Large holdings were divided into small farms and the number of landed proprietors, for the most part peasants, was greatly increased.

For more than thirty years before the world war, gradual but persistent changes had been taking place in the agriculture of France. The farmers of the nation had been slowly putting more and more of their plough lands into grass, abandoning the cultivation of cereals, industrial and leguminous plants, and putting more acres into roots, tubers, and annual forage crops. These changes in the relative acreages laid down to different field crops marked a general shift from extensive field-crop production to intensive animal husbandry. Field crops, except wheat, were produced more and more for feeding cattle and horses, the cash income of the farm being obtained in increasing proportion from the sale of animals and animal products, until during 1913-14 more than 70 per cent. of the total receipts of "middle-sized" farms were derived from this source of revenue.

The war deprived French agriculture of from 60 to 80 per cent. of its male labourers, some 3,284,000 farmers having been mobilised by 1918. Immediately following the opening of hostilities, the larger part of ten of the most productive Departments was occupied by the enemy forces. The immediate effect of the war was to cut down man power, which reacted in cutting down the acreage of all crops requiring hand labour and in increasing areas of crops that could be produced with less expenditure of labour. Cereals, leguminous plants, roots, and tubers decreased greatly during the war period, whereas grasslands and fallow lands were increased.

Soon after the signing of the armistice the French began to restore, as far as possible, the devastated provinces. The reclamation has been accomplished largely by means of power cultivation, although as late as 1925 certain areas had not been touched by the plough.

It is probable that the new levels of land utilisation established in French agriculture during the world war and post-war years are indicative of trends that are bound to become more or less permanent. The great expansion of cereal acreage in the United States, Canada, Australia, and other countries is rendering cereal production not only in France, but in Central and Western Europe (excepting Italy) less and less profitable, and the farmers of these countries are turning their attention to more payable lines of farming, in spite of attempts on the part of the Governments to bring the agriculture of each country as far as possible up to a stage of self-sufficiency in cereals from which is made their daily bread.

# BETTER QUALITY CREAM.

## UNITED EFFORT REQUIRED.

*"The suppliers of a choice article are entitled to, and they should receive, a higher value for their produce than a supplier who only tries to produce a first-grade article. Instead of all factory managers encouraging the production of quality cream, we find that the evil practice of working primarily for increased quantities still exists, and inducements in many cases are held out for individual suppliers and groups of suppliers to break away from the factory of which they are shareholders. Following a more effective grading of milk and cream by all factories there would naturally be a movement by the producers, the great majority of whom are always anxious to secure the best results."*

THESE remarks were made by Mr. G. Newton, of Maleny, in a paper read at the annual conference of the Queensland Butter and Cheese Managers and Secretaries, held in Brisbane last month. "The value of the dairying industry to Australia," said Mr. Newton, "demands very great improvements in the methods of production of milk and its products. During the past ten years practically all efforts towards improvement have been concentrated on the manufacture of cheese and butter, the pasteurising of milk and cream being accepted as the solution of quality defects; hundreds of thousands of pounds sterling have been spent in rebuilding and equipping factories with modern machinery. It cannot be claimed that the results to date are satisfactory. The quality of the manufactured article certainly shows a little improvement, but, unfortunately, the percentage of choice quality butter and cheese is altogether too low. This fact, together with practically no increase in production, demonstrates that financially the industry has made no progress whatever. The raising of values by artificial means, such as the Paterson scheme, cannot be claimed as having uplifted the industry at all.

"Generally speaking, the production of milk continues in the same haphazard manner to-day as it did ten or even twenty years ago. The dairy farms still provide excellent pastures when the rainfall is satisfactory, the cows produce about the same quantity of milk, which contains no more butter-fat, and nothing more is being done towards improving the quantity of the milk and cream delivered at the factories. . . ." It appears that what is required is more assistance for the industry by educating.

### More Production per Cow.

"In the first place increased production is urgently required. By this I do not mean more dairy farms and more cows, but more milk and more butter-fat per cow. I believe that this is the easiest of all problems with which we are faced to-day, and it is one that is exercising the minds of leading men in the industry throughout the Commonwealth. If every dairy farmer would realise how much better off he would be financially at the end of every year by keeping cows which would produce at least 300 lb. of butter-fat per annum, there would very soon be an enormous increase in production, and, of course, a corresponding reduction in the cost of producing butter and cheese. The experience of progressive dairy farmers in recent years has proved that 300 lb. of butter-fat per cow per annum can be produced from good pastures when the dairy herd has been selected by the use of the scales and Babcock tester. Pastures also can be improved by the use of a good strong chain harrow in the winter and spring months for breaking up and evenly distributing the lumps of manure and loosening the surface of the soil. A top-dressing of superphosphate every second or third year has been proved to be a paying proposition in many districts. Periodical ploughing and sowing of winter grass seeds of a nitrogenous nature, preferably clover, are also helpful. By increasing production the dairy farmers would be in a much better position financially, and they should be encouraged to provide fodder of some kind for use in the winter and early spring, when the pastures are not of much use; also on other occasions, when the rainfall is unsatisfactory.

### The Question of Quality.

"Secondly, we come to one of the most difficult problems (and, in my opinion, the most important one) facing us to-day, viz.:—The quality of milk and cream delivered at the factories. I feel sure that all of us present will admit that the

average quality of milk and cream delivered at the factories has not improved very much, if at all, during the last ten years. Factory managers must accept some responsibility for this. Apparently, too much has been expected of the pasteuriser as a means of removing defects in milk or cream before being made into cheese or butter; also the desire appears to be to cater for large supplies irrespective of quality, and then to turn out an article that while in a fresh condition will get past the grading officials as first grade or 'Kangaroo' quality, with a bit of luck. This policy, I believe, has been responsible for the low average value of Australian butter on the London market. Since the Commonwealth Government instituted a system of partial stock grading in London, we find that the majority of butter and cheese deteriorates during storage and shipment to a very serious extent. The explanation of this is, I feel certain, due to the fact that unsuitable milk or cream has been used, and the pasteurising treatment has not been effectively carried out. It is our duty to aim at producing quality butter and cheese. By this I mean an article that will open up after at least three months' storage true to label. The markets of the world will always absorb the best quality at the best price, and the purchaser is entitled to receive the best.

### Importance of Cleanliness.

"Cleanliness is not given the consideration that it should receive by those who milk the cows and carry out the work in the dairies and factories. The custom is to allow any one to take a job at this work, irrespective of whether such persons have received any instruction at all as to the absolute necessity of keeping all surroundings, utensils, &c., in the milking-yards, dairies, and factories absolutely clean. Milk for cheese-making and cream for butter-making, we all know, should be cooled so as to extract the animal heat and to get rid of feed gases, but this practice is most unfortunately the exception in far too many dairies to-day. Tainted cream during the summer months, caused by unclean surroundings or utensils and uneven ripening owing to lack of cooling is a very serious matter, and there is no doubt that too much of this class of cream is accepted by the factories as first grade. The supplier is satisfied, and, in many instances, the butter gets through the grading officials as first grade, but there is very little chance of it being any better than second grade by the time it reaches the London market, although, probably, a fair percentage of choice cream has been blended with the lower grade cream before being manufactured into butter. Carelessness, neglect, and lack of knowledge are the worst amongst the enemies of the dairying industry, and until all engaged in the production of milk realise this, and make a determined effort to attack and rout these enemies, progress is not going to make any advance.

### United Effort Required.

"I believe that the first movement should be a united effort by all factory managers, by tightening up the grading of milk and cream, to aim at turning out an article of undoubted quality that will maintain such quality until it has passed into consumption. This is being done in some instances, and it can be done by us all. The standard of Australian butter and cheese must be lifted out of the rut in which it has wallowed for so long on the London market, so as to obtain for Australian producers a financial return at least equal to that of the producers of New Zealand. Will Queensland factory managers make a move in this direction?"

### Responsibility of Producers.

Mr. Newton stated that some factory managers who had endeavoured to raise the quality of their output by effectively grading the article supplied had lost suppliers owing to the fact that managers of factories in other districts had accepted a cream of low quality, and returned to the suppliers a higher grade for their cream. The final result of this procedure was a continuance of the present low standard and value of Australian butter on the London market. If all factories graded cream strictly according to its quality, the only form of attack left to the supplier of low-quality produce would be to improve his methods and clean up his own area. This would bring about some means of instructing all those engaged in the production of milk on the absolute necessity of thorough cleanliness at every stage in the carrying out of each part of the work. This instruction, no doubt, would be very costly, but Mr. Newton expressed the opinion that it would be justified, and in a very brief time the increased financial return to the industry would show a handsome profit on the expenditure. The instructor could give very valuable assistance to the industry by acting as herd-tester, and he also should be qualified to give lectures on such matters as top-dressing of pastures, conservation of fodder, and the feeding of cows for milk production. To be effective the area allotted to each instructor should not include more than, say, 500 average dairy farms, which would allow of a reliable service at a total cost of not more than £2 per farm.

## WET VERSUS DRY MILKING.

By L. VERNEY, Dairy Inspector.

This subject has a direct bearing on the hygienic production of milk. Milk is the only perfect food containing all the elements necessary for the growth and development of the human body, consequently anything that is likely to cause a change in its nature should be carefully checked.

The healthfulness of milk depends solely upon its freedom from disease germs. Cleanliness may be preserved by the prevention of dirt contaminating the milk during the process of milking. If both these conditions are present, it naturally follows that the keeping quality will not be lacking, providing the utensils employed are sterilised before being used. The operation of milking is sometimes, unfortunately, conducted rather slovenly, and attention is not paid to absolute cleanliness in person, practice, and containers; in other words, to personal cleanliness, clean milking practices, and clean buckets.

The practice of "wet" milking has nothing to commend it. It is an unclean habit, and carries with it attendant evils. "Wet" milking, quite apart from contaminating the milk with harmful bacteria and dirt, is harmful to the cow by causing chapped teats and warts. The former results from the practice of allowing the animal to leave the milking-shed with wet and sticky teats. That very sore and annoying skin complaint known to most dairymen as "milk rot" is another evil effect of "wet" milking.

After one has had years of inspection work making notes of observations of the various phases and operations of dairying, one is able to come to a quick decision as to whether "wet" or "dry" milking is practised in any particular dairy, by examining the push-rods of the bails, division rails, leg-ropes, and milking stools for milk incrustations. These incrustations are silent but strong witnesses to the unclean habit of "wet" milking. In every instance where investigations have been made to ascertain the cause of the high bacterial count in the milk samples taken by the Department of Public Health, I have found that "wet" milking has been the underlying cause of the trouble. In no single instance have I been called upon to investigate on a farm where "dry" milking is practised. This alone should be sufficient to induce those dairy farmers who "wet" milk to adopt the more hygenic "dry" process. Before milking starts, the udder, teats, and flanks of the cow should be brushed. This should not be looked upon as superfluous, but as a very wise precaution, and should take no longer than is necessary to clean one's hands. If the udder and its attendant parts are encrusted with hard dirt, it is necessary to clean them with warm water—not cold, as is usually the case. The quicker action of warm water in the removal of dirt, and consequently the saving of time, should be sufficient inducement to the dairy farmer to always provide a supply of warm water for this purpose.

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## DAIRY PRODUCTS EXHIBITION.

### ADDRESS BY THE MINISTER.

THE Tenth Annual Show of the Butter and Cheese Factory Managers' and Secretaries' Association was opened by the Minister for Agriculture and Stock (Mr. H. F. Walker) on 19th June, at the Hamilton Cold Stores.

The show was a great success, both as regards the quality of the exhibits and the number of entries, while the attendance of those interested in the dairying industry was larger than it had been for some years.

Introducing the Minister, Mr. W. S. Hartley, South Burnett Co-operative Dairy Company, remarked that Mr. Walker had been connected with the dairying industry for many years. Those engaged in that industry would find in him a sympathetic friend, who would, at all times, do everything to advance their interests.

Mr. Walker, after commenting on the tremendous amount of minute work the judges had to do, and the care and discretion which they had to exercise in forming their conclusions, went on to praise the work done by the Queensland Butter and Cheese Factory Managers' and Secretaries' Association during the last ten years. "You are composed of the best brains that we have in the industry," he said, "and you avail yourselves of anything that is to be gained from a visit of experts from the South. By an exchange of ideas and the carrying out from time to time of these competitions, particularly under existing conditions, when there are such a large number of entries of the very finest quality from all over the State, you must be doing a tremendous amount of good for the industry."

### Need for Continued Improvement.

Mr. Walker added that after looking through the exhibition, even although he had travelled the world, he had no hesitation in saying he had never seen keener competition. If only the exhibition were sent home to the old country, and placed in a warehouse in Tooley street, it would command the respect of all of the experts there, and probably of the world. Naturally, after seeing the exhibits, the question arose: "Is it possible to improve upon the effort?" At the present time they might be inclined to say, "Almost impossible." That statement, however, had been uttered many years ago, but since then they had improved their exhibits to such an extent that to-day butter was entered which was almost unbeatable, and cheese was on view which the judge said was the best he had ever judged. It was only a few years since pasteurisation came in, but look what it had done for the industry.

They now had butter second to none in the world, and much of that improvement in quality was due to pasteurisation, which was introduced only fourteen or fifteen years ago. He wanted to say that they had to go on improving their product until they were in a position to say that Australia was the best butter-producing country in the world from a quality point of view. They, too, had to remember that they had not yet reached the maximum amount it was possible to produce. When the lands now vacant were occupied, and herd-testing was universally adopted, they would find that the industry now was only in its infancy. It was their duty as citizens to develop Australia so that it would carry at least twice the population of to-day, and could produce two or three times the amount of produce it was producing to-day.

### Problem of Wood Taint.

Mr. Walker recalled the words of Mr. Proud, that wood taint was the curse of the industry on the other side. "We have got to sit down as directors of our respective companies and take notice of a man like him," he said. "We must work with one common object in view, to rectify that trouble. If we cannot remedy the trouble as laymen or butter managers, then we will have to go to the department, which I can assure you will be prepared to help in overcoming this defect. In no circumstances must we have a continuance of this particular defect." The Minister said he was particularly pleased with the magnificent display. He congratulated the Kingaroy factory on winning the Australian championship in butter, and the Nanango factory on taking the Queensland championship. Although those two companies had won the big prizes, the Goombungee factory had created history by winning five firsts and a second. In the cheese section, he desired to congratulate Westbrook on winning the Australian championship, and Moola on winning the Queensland championship.

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## THE MILKING MACHINE—ITS CARE AND OPERATION.

At the Third Annual Conference of members of the New South Wales Agricultural Bureau for the South Coast and Monaro Districts, held at Bega (New South Wales) recently, Mr. Stan Solomon (Candelo) read a paper on the care and operation of milking machines, and the conference was so convinced of its practical nature that it is thought worth while quoting rather fully, as follows:—It is now over thirteen years since I first became acquainted with milking machines, and from experience I am convinced that the greatest factor governing success with a milking plant is absolute cleanliness. For this purpose water is required in large quantities, and provision should therefore be made to ensure a plentiful supply.

First, I will endeavour to clear up a point on which there is a great deal of misunderstanding, viz., the spread of mammitis through the herd by the machine. True, this is quite possible, but only by carelessness on the part of the dairy farmer. The examination of a few squirts of milk drawn from the cow by hand before fitting the cups on the teats will safeguard against putting the machine on an affected cow. Such cows should be returned to the waiting yard and later milked by hand. The milk drawn from the cows for examination is no great loss, as the first milk drawn from a cow contains very little butter-fat. It is likely to be contaminated with bacteria, and it is perhaps best rejected even if it is known definitely that the cow is healthy.

Mammitis can be spread through a herd by careless hand milkers just as readily as by machines. If an affected cow is milked and the milker continues milking other cows without thoroughly scouring his hands, he is taking the trouble along with him.

Affected cows should be left until last and milked into an old bucket kept for this purpose only. This prevents the germ-laden milk from reaching the floor. The habit of allowing this milk to reach the floor of the bails is all too common. A breeding ground is thus created for germs of a contagious nature, which are picked up by the cows' feet and carried to the pastures, where they gain entrance to the cow's system.

A four-cow plant may be handled efficiently by three capable people. Two need do nothing other than strip the milked cows, while the third party keeps the cows yarded, bails them, washes the teats and udders, and changes the machines from cow to cow as required. An alternative working system is for the entire staff to strip and attend to their own machines. The extra bail allows room to shift around. Waste of time must not be tolerated, or it will be reflected in increased fuel bills and general wear and tear. The work is fast but not heavy, and being soon finished the cows are at liberty to spend much more time in the pastures instead of standing about the yards.

Immediately after each milking the machine must be properly washed. Remove the rubber plug from the end of the main milk pipe. This admits a rush of air into the pipe and draws along any milk left there and delivers it to the separator vat. Next, each set of cups must be scrubbed externally to remove all dirt from them, which if left would be drawn up into the machine during the next washing and cause contamination. Then obtain a supply of cold water, about one gallon for each machine. Replace the plug in the pipe again, and commencing at the bail farthest from the releaser, place the machines, one at a time, into the water, which is drawn through the pipes. It is a good plan to keep lifting the machine from the water to allow it to clear itself; the bubbling action thus set up has an added cleansing effect also. The same operations are carried out, using boiling water to which a handful of washing soda has been added. After this, run the brush with a long cord attached through the main milk pipe. The vacuum draws this brush through; the cord is necessary when withdrawing. Once a week the cups and fittings should be entirely dismantled and thoroughly cleaned. Any rubbers that are worn out can then be renewed.

The releaser is also taken down each time and washed with the separator parts. About once a week the vacuum or main air pipe should be washed out, as a small quantity of grease from the pulsator slides finds its way into the pipe. This does not affect the milk, for it is in the pump air line and not in direct contact with any milk. To clean this pipe the pulsator drive is disconnected and the pulsators placed in the "closed" position. Next, place the small down air pipe into a bucket of boiling water containing a little caustic soda. This removes all grease from the pipe and carries it to the vacuum tank, which is then taken down, emptied, and scrubbed out. The vacuum tank must be taken down after each milking, and all taps left open to allow the free passage of air through the pipes.

This method of cleaning and general care has always been rigidly adhered to with my plant, and records over a period of ten years show no butter graded below choicest. The cleaning methods mentioned would appear to entail much time and trouble, but actually the description takes about as long as the daily cleaning, while about three hours once a week will see the dismantling through.

A 4 h.p. engine is used. This is more than necessary for ordinary purposes. An engine from 3 to 3½ h.p. will drive a milking plant and separator comfortably. It is convenient, however, to have an engine capable of operating the separator at the same time as the milking machine, for it is a great saving of time and money to complete the separating at the same time as the milking.

The cows have always behaved quietly and contentedly while being milked with the machine. The average returns over periods of machine milking compare most favourably with similar periods of hand milking. I believe if a cow is made comfortable and contented, a machine does not affect the production adversely.

I find the machine costs, on an average, £57 per annum for general maintenance, about £36 10s. being the cost of kerosene fuel. This is based on one tin of kerosene for every five days, 10s. per tin being the present price. If power kerosene is purchased in quantities of ¼ or ½ ton lots this cost is reduced considerably. Approximately £6 and £5 per annum is expended on benzine and lubricating oils, respectively. The benzine is used for starting the engine. The balance, about £9, is expended on rubbers and other replacements. Teat cup inflations last from three to four months, claw tubes from six to nine months, while the main 33-inch milk tubes and vacuum tubes have an average life of about four years.

To give best results a machine must not work with more than 15 inches of vacuum; about 14 inches is the usual working reading. In the air pipe there is a relief valve to control the vacuum suction. The stem of this valve must be oiled occasionally to prevent sticking. If the vacuum suddenly drops below 14 inches it is sure evidence of a leakage of air. Commonly this happens while a machine is being changed, but this loss can be avoided as one becomes experienced at changing. A constant leakage may be traced to an old swollen rubber ring in the releaser preventing the flap valves closing properly. If all rubber connections are found to be in good condition and the vacuum still shows a low reading, the spring on the relief valve may have weakened and become loose. This can be remedied by screwing down the spring until the gauge reads correctly. If the gauge is too high the spring, of course, must be loosened. The inflations are best kept tight; the machine then stays on difficult cows considerably better, and the milk is drawn more rapidly. A tin of water and clean cloth should be provided in each bail for washing the udders and teats of the cows.

For the man who is short of labour or desires to reduce the wages list the machine solves the problem. If it dispenses with the labour of only one man, it pays to have the machine. Added advantages are the more congenial working conditions, and the production of a cleaner and superior quality milk. The milk is cleaner, for it is under cover from the time it leaves the cow until it enters the vat. This difference is noticeable in the bowl of the separator.

During the discussion which followed, Mr. E. H. Filmer said that Mr. Solomon's advice was always of the soundest nature, and, what was more, he always practised what he preached. For years Mr. Solomon had been noted as the supplier of the best cream to the Bimbaya factory.

The question was raised as to whether machine or hand milking was the more economical during the slack winter period. It was generally admitted that milking by hand was perhaps quicker and less costly during those months when only a comparatively few cows were in milk.

In answer to a query, Mr. Solomon said that he preferred a kerosene engine because of the cheapness of the fuel, but agreed that a petrol engine was cleaner. He would not like to recommend one type of machine in preference to another.

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## YOUNG FARMERS AT THE BRISBANE SHOW.

### ANNUAL CAMP.

The Department of Public Instruction is considering the preparation of an exhibit for the forthcoming Royal National Association's Show in August.

Last year the display was indicative of the department's activities generally. This year, in view of the growing interest in country districts in the Home Project Club scheme, it is proposed to make a display which will afford the public an insight into the nature and purpose of that particular section of the department's activities. In 1928, in connection with the Annual Show, the Royal National Association established a farm boys' camp, the members of which were nominated by the schools participating in the schools' agricultural home project movement, and an interesting and instructive week was spent in Brisbane by the selected members, addresses being given by prominent citizens, agricultural and stock experts.

This year a camp will again be held, and to attend it a selection of the most efficient members of school project clubs will be made from all the clubs operating in the country. In the pavilion will be displayed an exhibit appropriately displaying models suggestive of the interest, knowledge, and practical skill displayed, which has earned for these selected club members the privilege of attending the Show as the guests of the Royal National Association.

The possibility of showing models of the work of these schoolboy members of these agricultural project clubs is now being considered, and it is hoped that an interesting exhibit will be staged.

*Photo.: Dept. of Public Instruction.*]

PLATE 36.—PIG CLUB MEMBERS AT A COUNTRY SHOW.

Not the least enthusiastic exhibitors at some of the Country Shows are members of the local School Pig Club.

*Photo.: Dept. of Public Instruction.*]

PLATE 37.—THE BOY AND HIS PRIZE.

This earnest young Pig Club member is proud of his fine exhibit.

*Photo.: Dept. of Public Instruction.*]

PLATE 38.—THE PRIDE OF THE YOUNG QUEENSLAND DAIRY PEOPLE.

Home Project Schemes are becoming increasingly popular in Queensland Country Schools. Scholars voluntarily form the clubs under the supervision of trained instructors who are enthusiastic stockmen. The projects embrace Pig Clubs, Calf Clubs, Poultry Clubs, Maize Clubs, and Fruit-Packing Clubs.

*Photo.: Dept. of Public Instruction.*]

PLATE 39.—THE "DAY OF JUDGMENT" FOR CALF CLUB MEMBERS.

A typical scene in a country school ground when the fortunate animals, the object of the unremitting care of anxious, yet proud young owners for so many weeks, are paraded for the critical and impartial scrutiny of kindly judges.

# STERILITY IN BREEDING SOWS.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

We have recently received many inquiries on the subject of sterility or barrenness in sows, of which the following is typical:—

"I have two Berkshire sows and one boar which have been specially selected from a leading stud as foundation stock for my Berkshire herd. These pigs are now nearly eighteen months' old, but up to the present the sows have had no litters, and they have not shown any inclination to breed. They are running in a 2-acre paddock, sometimes with the boar and sometimes apart, but the boar does not seem to have any inclination to breed either. I think the pigs have been handled correctly though for some months during the summer both boar and sows were rather fat, but during recent months they have been out grazing and are not overfat now. What I should like to know is, is there any way of inducing sexual activity, and is it any use carrying these animals on any longer?"

The following answer was supplied:—

A great many of the cases of sterility and barrenness in pigs are due to the animals being overfat and lazy. There are many instances also in which the boar is too fat and lacking vigour. It is unfortunate that many strains of pigs, particularly purebred pigs, have been practically ruined through being kept in a very fat show condition for exhibition purposes over lengthy periods; it is equally unfortunate that many of their progeny suffer as a result and fail to breed satisfactorily if they breed at all. These conditions can very largely be overcome by reducing the condition, first by lessened diet, by the use of green foods, and also by compulsory and regular exercise. Frequent doses of Epsom salts should be given, using from two to four ounce packets per dose in half a pint of warm water, preferably as a drench first thing in the morning or in the food. The pigs should be compelled to hunt for part of their living over reasonably large, well-grassed pig paddocks (an acre or more in area). Green foods (lucerne, clover, sorghums, pumpkins, rape, and barley), root crops (sweet potatoes and artichokes, &c.) are suggested. Some cases of barrenness are due to septic inflammation of the womb, the result of germ infection due to stock being kept in unclean sties, and to boars serving clean sows after having bred to sows suffering from infectious diseases of the womb. In these cases, and in all cases where the sow will not hold to the service of the boar, it is advised to syringe the uterus with a solution of one tablespoonful of salt in one pint of sterile water, i.e., water that has been boiled and that has been allowed to cool down to blood heat. If this does not give satisfactory results, try 20 grains of permanganate of potash in one pint of sterile water at blood heat, and follow up with a salt solution every day for three days before service. During treatment also give Epsom salts as a purgative. It is advisable also, if at all possible, to change the boar, using a young vigorous animal. The sows should be kept away from the boar until they are ready for service, and after being stinted they should immediately be placed in a clean, dry sty, away from the other pigs, and should be kept quiet for several hours. If they still seem restless, mate them again the following evening and follow the same practice. Sterility is also often induced through the animals being improperly nourished and through their lacking stamina and vitality.

Many sows commence stud duties too young, many boars are also ruined in this way; neither should be so used before ten or twelve months old.

Hereditary influence is also a factor, the progeny of shy breeders often failing to breed at all. Injuries to the genital organs of the male are also a frequent cause of the sows failing to breed. The boar may have become weakened through frequent unsuccessful attempts at service, this especially so when a young boar is running with a lot of full-grown sows. The boar in this case is often punished severely by the sows and kept away from the food trough. It frequently happens that a young boar so injured becomes so "cowed" that he is ever afterwards afraid, and becomes quite effeminate. There are many other causes, too, such as the use of improperly balanced rations, diseases of the genital organs of the boar, hot, dry seasons, and so on.

The remedy lies in the removal of the cause wherever that is possible and in culling out unsatisfactory breeders. Satisfactory specifics for the treatment of pigs that are unsatisfactory breeders are well advertised. In a general way, however, we do not recommend the use of medicinal agents for the purpose indicated.

# SCHOOL OF INSTRUCTION FOR PIG FARMERS.

## AT GATTON COLLEGE, 10th TO 21st JUNE, 1929.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

Discussing matters associated with the Second Annual School of Instruction to Pig Farmers, members of this school referred to the opportunities thus offered as an immense success; a grand opportunity for getting together; an educational treat for both young and old; and a school at which farmers in increasing numbers from every part of the State should endeavour to be present.

As at last year's function the school was again conducted at the Queensland Agricultural High School and College, Gatton, the scheme being a co-operative one, organised by officers of the Departments of Agriculture and Stock and Public Instruction.

The school represents the most important function of its kind in the pig industry throughout Australia, and is destined to become of increasing importance as its membership grows and more people become informed of its possibilities. In age the members of the school ranged from a lad of fourteen years (Arthur Mills), a member of the Gilston State School Pig Club, on the South Coast, to Mr. E. Hill and Mr. B. G. Wilson, experienced and successful farmers from the Beaudesert and Rosewood districts, with farmers of varying ages and experiences between making up the balance. It is the principal school of its type in the Commonwealth, though Farmers' Winter Schools, at which special lectures and demonstrations on pig raising are given, have been a feature in the Southern States for some years.

At this School of Instruction, Pig Raising in all its different branches is the special subject studied, though a perusal of the programme indicates that there are a wide range of subjects for study and inquiry, and quite a number of lectures and demonstrations on allied subjects with lecturers drawn both from Government Departments and from business enterprises.

Those present at the school were drawn from districts extending from Millaa Millaa on the Atherton Tableland, to Gilston, via Nerang, on the South Coast, Brigalow and Dalby districts in the West, and from other areas in the Central and Southern parts of Queensland. A number of college students attended some of the lectures, while several university students were also present when subjects of special importance were being discussed.

### Pig Production.

In his opening address the Principal of the College, Professor J. K. Murray, B.A., B.Sc., N.D.D., officially welcomed the students on behalf of the Departments of Public Instruction and Agriculture and Stock. College life and routine were dealt with in detail and the visiting students were invited to dine with the college

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NOMINAL ROLL FOR PLATE 40.

*Front Row* (left to right)—

B. G. Wilson (Rosewood); E. J. Shelton, H.D.A. (Senior Instructor in Pig Raising, Department of Agriculture and Stock, Brisbane); Professor J. K. Murray (Principal, Gatton College); A. J. Mackenzie (Instructor in Animal Husbandry, Gatton College); Walter Baker (Chairman of Pig School Committee, Greenmount).

*Second Row* (left to right)—

Arthur Mills (Gilston); W. Koehler (Yamsion); Fred. Davison (North Arm); G. Muller (Brigalow); E. Hutchinson (Staff at College).

*Third Row* (left to right)—

A. Muller (Brigalow); Clem Manning (Department of Agriculture and Stock, Brisbane); Noel Harding (Flaxton); D. F. L. Skerman (Kaimkillenbun).

*Fourth Row* (left to right)—

E. Retchford (Millaa Millaa); M. Lyndon (Worongary); Robt. Turpin (Manly); Alex. Davidson (Brisbane); R. M. Moffatt (Tarome); E. Hill (Beaudesert); J. Woodward (College).

*Back Row* (left to right)—

Noel Muspratt (Littlemore); C. W. Bowden (Gilston); J. Canty (College); T. Friis (College); Otto Lolauja (College).

*Absent*—R. D. Johnston (Kingaroy) and G. A. Salisbury.

*Photo.: T. Harris.*]

PLATE 40.—GATHERING OF PIG FARMERS AT THE SCHOOL OF INSTRUCTION, GATTON COLLEGE, QUEENSLAND, JUNE, 1929.

(See page 82.)

students and to make the fullest use possible of the lecture rooms, library, and reading rooms; and to visit other sections of the college, as well as the Pig Section, at which he explained more than 300 pigs were kept, and where an extensive series of experiments in the breeding and handling of bacon pigs were in progress.

Discussing various aspects of the pig industry the Principal supplied statistics showing the distribution of pigs throughout the Commonwealth, and pointed out that the increase in the number of pigs throughout the Commonwealth was steady to 1917, when the number of 1,169,365 was the total for the Commonwealth. This million decreased somewhat, but passed the million again in 1925. In that year the number of pigs in Queensland was about 200,000, in Victoria well over 300,000, and in New South Wales well over 400,000. The number carried in the United States of America and Europe indicated that there should be a marked increase in hog raising in the Commonwealth. In other parts of the world, notably in the United States, the growth of maize and the raising of pigs have followed closely together. In fact, during the war years, when lard was required in large quantities, the United States fixed the price of pigs on the basis of value of 13 bushels of maize, this value being expected to encourage the use of maize for pork production. Queensland's conditions make it the greatest maize State of the Commonwealth, maize being a summer-growing crop, and Queensland enjoying summer rains. This was also a great dairying country, and there were no two better foodstuffs for pig breeding than separated milk and maize.

### Economics of the Industry.

The rises and falls in the volume of pig production were more sensitive to price fluctuations than was for instance, orchard production. This followed from the ability of the farmer to increase or decrease production rapidly owing to the prolificacy of swine. A satisfactory market price was then a major controlling factor in production. The export market undoubtedly existed but the price received was not encouraging. It was well to remember that an increase of profit could be equally as well obtained from decreased cost of production as from an increased market. Studies in the costs of production at schools like this could do a great deal of good and effect a national service. The discussions of improvements in farm management indicate that very often crossbreds give the best economic returns and suit the market requirements. Information regarding the balancing of rations and the lowering of their cost, details of crossing and grading of pigs, the care of the sow and her litter—all these could greatly help in determining the cost of production. Notes on the requirements of marketing and the co-operative efforts to handle the output might indicate ways in which the farmer helps himself by helping others. The industry should be careful not to adopt schemes which encourage faulty methods and inefficiency.

### Promotion of Efficiency.

Professor Murray concluded his lecture by pointing out that not only must there follow an increase in efficiency through the experiments in pig breeding at the college, but also through making full use of the great mass of knowledge already available but sadly neglected. He believed that such schools for the assistance of farmers were a most important activity of an agricultural college.

Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising, and Mr. Mackenzie, Lecturer in Animal Husbandry, at the college, also welcomed the visiting farmers and forecasted a very useful term of association with the college and its staff.

### Syllabus.

The syllabus was a comprehensive one, and included the following:—

| Subject. | Lecturer. |
|---|---|
| Agricultural Education | Professor J. K. Murray, B.A., B.Sc., N.D.D., Principal of the College. |
| Microbes | |
| Principles of Feeding | |
| Economic Phases of the Industry | Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising. |
| Description of Breeds | |
| Design and Construction of Piggeries | |
| General Care of Pigs | |
| Judging | |
| Results of Cross Breeding | |
| Preparation of Pigs for Show and Market | |
| Fodder Crops | College Staff. |

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|---|---|
| Anatomy<br>Diseases of the Pig<br>Improvement of Breeds<br>Physiology<br>Administration of Medicines<br>Post Mortem Examinations | Major A. J. Mackenzie, Lecturer in Animal Husbandry. |
| Commercial Pig Farming | Mr. R. G. Watson. |
| More Money in the Farmer's Pocket | Mr. J. F. F. Reid, Editor of Publications, Department of Agriculture. |
| Paper on Pig Hygiene | Mr. H. G. Cheeseman, Senior Slaughtering Inspector, Department of Agriculture and Stock. |
| Farm Book and Record Keeping | Mr. J. H. Woodward, Senior Clerk, Queensland Agricultural High School and College. |
| Soils | Mr. G. J. Saunders, M.Sc., B.E., A.A.C.I., Principal, Technical College, Ipswich. |
| Disinfectants<br>Tuberculosis in Pigs | Mr. C. J. Pound, Government Bacteriologist. |
| Marketing Pigs | Mr. Geo. Setch, Marburg. |
| Pig Clubs | Mr. A. G. Aitchison, Organiser of Agricultural Projects, Department of Public Instruction. |
| Australian Stud Pig Breeders' Society | Mr. Percy Campbell, President of the Queensland Branch. |
| Address by Mr. Ernest Baynes | President, Royal National Agricultural Association. |
| Agricultural Economics | Mr. L. R. Macgregor, Director of Marketing, Department of Agriculture and Stock. |
| Demonstration of Value of Various Cuts of Bacon | Mr. A. B. Anderson, of J. C. Hutton's Proprietary, Limited. |

### Visit to Bacon Factories.

On the occasion of the visit by the party of farmers and college students numbering forty-five to the Queensland Co-operative Bacon Association Ltd. factory at Murarrie and Messrs. Foggitt Jones, Pty. Ltd. factory at Oxley (both bacon curing and canning establishments), the visitors were hospitably received and were shown every possible courtesy. They were given the opportunity of inspecting the several sections of the plants, noting the treatment of pigs from the time they arrived by train or road from farmers throughout the State, to the time they were slaughtered and converted into innumerable appetising products. The party was particularly impressed by the immensity of the business and with the up-to-date system adopted at these factories, and in the efficient and expeditious handling of the factory products. At Foggitt Jones, Pty. Ltd. a display of no fewer than forty-five lines of canned delicacies was on view in addition to other fresh and preserved products. Luncheon and afternoon tea were provided at these functions, pork products being a special feature of the menu.

### At Murarrie.

In a short address Mr. J. A. Heading, Chairman of Directors of the Queensland Co-operative Bacon Association Ltd. at Murarrie, welcomed the party of farmers and students and emphasised the importance of farmers visiting the factories at which their pigs were treated, so that they would become more conversant with the classification and grading of the animals and carcases and with methods of manufacture and distribution.

Mr. Heading thought the building up of co-operative bacon factories owned and financed entirely by the farmers should engender a pride in the heart of every producer, especially as in this case, the factory had only been established fourteen years. He explained that the co-operative factories were run entirely in the interests of the farmers resident in the State and pigs were treated, both on behalf of the shareholders and other suppliers, the resultant profits being utilised both for payment

of bonuses as well as for providing funds for financing extensions of operations, and in making provision for future years.

He dealt with the type and quality of the pigs marketed and was proud to say there had been a marked improvement in this regard in recent years. There were, he said, unfortunately, still a number of pigs coming forward that were not suited to the requirements of the curer, and the treatment of these incurred a heavy loss on the factory. It was a fact, he added, that the consumers as a body were much more particular now-a-days than they were in years gone by. The housewife wanted prime quality, fleshy pork, bacon, and ham, and she did not want it too fat, nor would it suit if it were too lean, and there was but little sale for heavy weight meat of any description. It therefore behoved everybody to take a keen interest in the business so that they could give the consumers the article they required and were prepared to pay for in increasing quantity.

If this could be done it would mean more money in the farmers' pocket and greater profits in the process of manufacture. Good seasonal conditions, he explained, often resulted in farmers holding the pigs too long on their farm and then marketing them in an overfat condition. This was a means of utilisation of greater quantities of farm foods, but farmers should remember that market demands were more stable than seasons. They should, therefore, aim continuously at marketing at prime weight and in medium condition, pigs showing a larger proportion of lean meat than fat.

**Development of the Industry.**

He stressed the extent to which the industry had developed in recent years, but emphasised that market requirements were also changing, and there was little likelihood of a return to the days when heavy fat meat was in demand. Conditions overseas had changed also, though the 200 lb. comparatively fat pig was still saleable there. Consumers in colder countries could do with a good, thick slice of fat with their bacon and ham, but where warmer climatic conditions prevailed there was and had been a decided tendency to reject the fat in favour of more lean meat.

He explained that the Queensland Co-operative Bacon Association was made up of 5,000 shareholder suppliers, and about 1,000 more in process of becoming shareholders in the concern. He did not think the producers need fear over-production so long as the quality of the pigs were maintained. Farmers in every portion of the State had actually proved in their own factories that they could produce and market stock of desirable quality at lucrative prices, and he urged them to give a greater consideration to the matters such as were being stressed at the pig school and by the various marketing organisations. More than £2,000 were recently spent at Murarrie in improvements and still further additions were contemplated.

He also emphasised the importance of strict attention to cleanliness and sanitation, with a view to reducing losses and ridding their farms of disease. He hoped the various schemes for providing instruction for both senior and junior farmers would expand, until every portion of the State was provided for and every farmer fully informed as to the importance of producing clean, healthy pigs.

**Theory and Practice.**

Mr. A. J. Mackenzie thanked the association, on behalf of the college, for the opportunity the party had enjoyed of seeing the operation of the factories. The college, he said, could teach the theory, but it remained for the factories to demonstrate the practical aspect from the killing floor to the consumer's plate.

Mr. Shelton also thanked the directors and management for their courtesy and hospitality, and explained that there were farmers present from many distant portions of the State. He hoped farmers would busy themselves and ask as many questions as possible with a view to gaining greater knowledge. He also hoped that at future schools similar opportunities would be provided, for thus bringing farmers and their sons together.

Mr. Walter Baker, chairman of the Pig School Committee, thanked the directors and staff on behalf of the farmers and felt sure that much good would result from the visits.

**At Oxley.**

At the Oxley Factory the party were met by Mr. F. W. Martin, representing the Proprietary Bacon Factories of Queensland, Mr. Waters, of Foggitt Jones, Pty. Ltd., Mr. White, foreman of the Oxley Factory, and Mr. Shand, foreman of the Canning Department, and were shown over the whole of the plant, including that portion of the works where cattle are treated in increasing numbers each year.

**Back at the College.**

In the course of an address Mr. George Setch, of Marburg, a prominent local farmer and a director of long standing at the Queensland Co-operative Bacon Association Limited, referred to his experiences during visits to countries overseas, where pigs are marketed in far greater numbers than is the case in Australia. He also stressed the value of the production of pigs of correct type and quality, and the utilisation on the farm of as much of the farm produce as possible. He stated that in his experience over a long period of years he had marketed thousands of pigs at a profit. To do this he had utilised food produced on his own property and had not sold a bag of corn or a bale of hay, except as pigs on the hoof or cream in the can. He recommended all present to aim at reducing costs of production by more efficient methods and by studying the market conditions at all seasons of the year.

Mr. John Hardcastle, of Dugandan, was unfortunately unable to attend to give his address on Weighing and Branding of Pigs, and Mr. F. W. Martin, of Stock Agents Ltd., through indisposition, was compelled to forego the opportunity of addressing the gathering as a representative of the Proprietary Bacon Factories, on the marketing of pigs.

Mr. A. B. Anderson, of J. C. Hutton's Pty. Ltd., gave a short talk on the importance of studying the requirements of the consumer.

A "pork products luncheon" was supplied through the courtesy of the Queensland Bacon Curers Association, representing Southern Queensland Bacon Factories.

In next month's journal several of the interesting papers read in the course of the school will be summarised for the benefit of those who were unable to attend the school.

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**SUBSCRIPTIONS TO THE JOURNAL.**

**Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.**

**To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.**

**Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.**

**On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?**

# Answers to Correspondents.

## BOTANY.

*Replies selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—*

### "Wheat Grass."

S.D. (Oakey)—

Your specimen is *Agropyrum scabrum*, a fairly common grass in parts of Queensland and New South Wales, generally known by the name of "Wheat Grass," and always occurring in small patches in the ordinary mixed downs pasture. It varies considerably according to the class of soil on which it is growing, but on the better-class soils makes a good vigorous growth of rather succulent forage relished by stock, and is of value as growing through the winter and spring months when other food is scarce.

### "Caustic Creeper"—*Euphorbia Drummondii.*

J. J. O'S (Boobin, Great Northern Railway)—

Your specimen is the "Caustic Creeper", *Euphorbia Drummondii*, found in practically all the Australian States, and generally regarded as poisonous to stock. "Caustic Creeper" is a name commonly given to it, though in Queensland it is just as frequently known by its botanical name. Reports about the poisonous properties of this plant in the past have been very conflicting, sheep at times having eaten fairly large quantities of it without ill effects following, but having more effect on travelling stock than on resting sheep or cattle. In New South Wales it has been found recently that the plant commonly possesses a prussic-acid-yielding glucoside, but though for some years past we have made repeated tests with the Queensland-grown specimens, they have always yielded negative results, and the symptoms as reported by drovers, &c., are not those of prussic-acid poisoning. The general symptoms of poisoning by this plant are a distinct swelling in the head and neck of the affected animals. Sometimes when these are particularly large they are opened by sheepmen and an amber-colourd fluid exudes. The sheep may recover, but the face has the appearance of having the skin scorched off it.

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### Dip for Spraying Horses.

K.N. (Wellington Point) asks what is the maximum proportion of phenyle (sheep dip) and water that may be safely used as a wash on a horse troubled with ticks. Veterinary Surgeon J. A. Rudd advises:—

I find Cooper's Cattle Dip best for spraying horses. One ounce of Cooper's Dip to one gallon of water makes a strength of 1 to 160. I have sprayed a horse at a strength of 1 to 150 with Cooper's Dip once every seven days for two years without any harmful results. One ounce of Cooper's Dip to seven and a-half pints of rain water will make this strength, and hand-washing is not advisable. Spraying is the better method, and should be practised when using Cooper's Dip. I have seen some bad results caused by hand-washing at this strength.

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### Australian Grapes in Canada.

D.G. (Stanthorpe)—

The Australian grapes consigned to Vancouver by the s.s. "Niagara" were of the Obanez variety, and were packed at the Griffith (N.S.W.) Producers' Co-operative sheds under the supervision of Mr. V. C. Williams, a director of the company, and shipped on or about 11th April last.

The cases used were three-quarter bushel with a centre division, and were made of white American case wood (spruce or hemlock).

At the time of packing the fruit was on the green side, and was allowed to wilt until the berries showed signs of shrinking; the time allowed for wilting varies from two to five days, according to the weather conditions.

The cases were first lined with paper, a layer of cork placed in the bottom, and then a layer of grapes, which were covered with cork, and the cork shaken well through the bunches. The second layer of fruit was then packed and the case filled with cork dust, care being taken to see that a reasonable quantity of cork was between the fruit and the sides of the case. After nailing down, two wires were bound round the case. The cases contained from 21 lb. to 22 lb. of grapes, and approximately 4½ lb. of cork dust. According to a Press message from Vancouver of 2nd May, the shipment arrived in perfect condition. The flavour of the fruit was reported to be excellent, and the price at which they sold on an eager market was 1s. 6d. a lb.

## DIRT AND DIET DEFICIENCY IN PIGS.

Good food, in a fresh state and fed under cleanly conditions, goes a long way towards preserving health in pigs.

Good food means food which in the total has all the elements of nutrition. Pigs, like other animals, must have a proper proportion of such mineral substances as lime and phosphorus for the building of their frames, and especially is such a sufficiency important in the case of breeding sows—neglect to ensure it results in bad litters and poor growth. There are strong indications that mineral deficiency is the factor responsible for a number of those conditions described as paralysis, and it is also intimately associated with rickets.

Deficiency of lime and phosphorus can be repaired by the addition to the feed of, say, half an ounce (about a dessert spoonful) daily of sterilised bonemeal. A supply of wood ash and charcoal, to which a little sulphur and salt have been added, is also appreciated by the young pigs, and supplies any shortage in the mineral constituents of their food.

The pig is well adapted for the disposal of many waste foods of the household, farm, orchard, and dairy, but unless these foods are in a sound and wholesome condition serious troubles may be caused by their use, and the quality and market value of the carcase may suffer. Scours and inflammation of the stomach and bowels are usually due to incorrect and filthy feeding. Food such as swill, skim milk, and buttermilk which is stored in old tanks, casks, and like receptacles is liable to cause similar trouble if no effort is made to keep the vessels in a sanitary condition.

Strict cleanliness with regard to vats, troughs, and other feeding utensils is essential. Uneaten food should be removed, and the troughs cleaned before another supply is given. Where swill and hotel refuse is collected for food it should be fed before it becomes soured, since there is great danger of poisoning from soured swill. In addition, it should always be boiled before use.

Fruit, vegetables, and root crops when rotting are also a common source of digestive derangement, whilst maize fed in a mouldy condition may cause poisoning and nervous disorders. The danger of sickness may be lessened in all these cases by boiling the food before giving it to the pigs.

Pamphlets of interest to pig farmers are available free on application to the Under Secretary, Department of Agriculture, William street, Brisbane.

## ANIMAL MANURES.

Farmyard manures are solid and liquid excreta from animals, and form one of the universal manures used by most gardeners—complete for all purposes in horticulture. It must, however, be used with care and intelligence. In some places where large and cheap supplies are available, the soil is saturated with manure.

The greater the quantity of manure incorporated with the soil, the greater the necessity for plenty of fresh air to bring about decomposition and ultimately humus. Now, if a soil has not been deeply dug or trenched, and it happens to be of a heavy nature, it is possible that the rains will not pass away readily; then the manure begins to get sour, fresh air, with its oxygen is driven out, carbonic acid gas develops too freely, and the beneficial bacteria are suffocated or annihilated by their enemies, which come into being owing to the lack of fresh air.

To avoid these troubles the soil should be well and deeply dug, and whenever extra large quantities of manure are used, the soil should be afterwards dressed with lime to keep it in a sweet condition.

# General Notes.

## Staff Changes and Appointments.

Messrs. A. H. Corry, M.R.C.V.S., E. Baynes, P. Short, and Jas, Sprott have been appointed Members of the Southern District Stallion Board. Major Cory will act as Chairman of the Board.

Mr. J. H. Gregory, of Melbourne, has been appointed Instructor in Fruit Packing, on probation for a period of six months.

The following have been appointed Assistant Cane Testers for the forthcoming sugar season, at the mill set out opposite each:—

Miss O. Knight, Bingera; Mr. T. F. Corbett, Marian; Mr. C. H. Humphreys, Moreton; Mr. H. T. Whitcher, Maryborough;

and Miss E. Rowe has been appointed to Millaquin Mill instead of to Marian Mill as previously approved.

The resignation of Mr. D. A. Parker, of Eungella, Mackay, as Officer under the Animals and Birds Acts has been accepted as tendered.

Mr. J. Legg, D.V.Sc., M.R.C.V.S., Townsville, has been appointed Chairman of the Northern Opossum Board, vice Mr. W. R. Holmes, transferred.

It has been approved that Messrs. E. T. Lewin and S. C. Allan, Inspectors of Stock, be attached to Julia Creek and Cloncurry Districts, respectively.

Mr. Thomas Law, of Arawee, Adavale, has been appointed Government Representative on the Adavale Dingo Board, vice Mr. F. B. Rutledge, resigned, and Mr. R. E. Gibson has been appointed a member of the Board, vice Mr. W. Hazlett, resigned.

The following members of the Police Force have been appointed Inspectors of Slaughterhouses:—Acting Sergeant M. Cranitch, Wondai; Constable C. B. I. McNaught, Yaraka; and Constable T. E. Martin.

Mr. W. J. Sheahan has been admitted to the Public Service and appointed Inspector of Stock on probation, and will be stationed in the Helidon district.

Mr. H. A. Galloway (Clerk, Depositions, Petty Sessions Office, Brisbane), at present seconded for duty to the Chief Secretary's Office, Brisbane, has been seconded for duty to the Chief Office, Department of Agriculture and Stock, as from 6th June, 1929, and until otherwise determined.

Mr. A. H. Knuth has been appointed trappers' representative on the Northern Opossum Board, vice Mr. A. H. Baumann, and Mr. Thos. Fisher appointed trappers' representative on the Northern Coast Opossum Board, vice Mr. Daniel Brophy.

The following have been appointed Cane Testers and Assistant Cane Testers for the forthcoming sugar season, and will be stationed at the Mills set out opposite them:—

Cane Testers.—Miss S. Riley, Babinda; Mr. V. F. Worthington, Cattle Creek; Mr. C. J. Boast, Fairymead; Miss I. Palmer, Farleigh; Mr. T. D. Cullen, Gin Gin; Miss A. L. Levy, Isis; Mr. H. Jensen, Inkerman; Mr. P. H. Compton, Marian; Mr. W. J. Richardson, Kalamia; Mr. L. Chadwick, Maryborough; Mr. L. G. F. Helbach, Millaquin; Miss M. T. Smith, Moreton; Mr. A. G. Kelly, Mulgrave; Miss D. Marles, Mourilyan; Mr. T. Herbert, Mossman; Mr. C. H. Jorgensen, Pioneer; Mr. T. V. Breen, Pleystowe; Miss F. Parkinson, Proserpine; Miss J. O'Flynn, Qunaba; Mr. L. C. Home, Racecourse; Mr. J. Howard, Rocky Point; Mr. F. C. J. Jorss, South Johnstone; Miss E. Christsen, Tully; Mr. W. J. Mason, Bingera; Mr. W. Ahern, Invicta; Miss J. Orr, Mount Bauple; Miss N. Walsh, North Eton; Mr. T. P. Brown, Plane Creek.

Assistant Cane Testers.—Miss M. A. Lyle, Farleigh; Miss G. Dingle, Inkerman; Mr. G. Tait, Kalamia; Miss D. Bowder, Marian; Miss E. Rowe, Marian; Miss M. Whittle, Plane Creek; Miss C. Humphreys, Pleystowe; Miss A. Mullin, Pleystowe; Miss M. A. Morris, Proserpine; Miss M. Orr, Tully.

## New Sanctuaries—Islands off the Central Coast.

Miall and Middle Islands in Keppel Bay, Heron Island in the Capricorn Group, and portions of Westgrove and Warrinilla Holdings, lying to the north of Injune, have been declared sanctuaries for animals and birds. The lastnamed sanctuary was made in view of the fact that the opossums therein are doing valuable work in the destruction of the caterpillars of the Saw Fly, which do much damage to stock in the district.

### Merging of Important Australian Industries.

Users of rubber tyres and rubber products of every description throughout Australia will no doubt be interested in the union of the Dunlop and Perdriau companies. The development of these two Australian enterprises since their formation has been phenomenal, but it was realised that by a consolidation of interests considerable economy would be effected.

In future the new organisation will be known as the Dunlop-Perdriau Rubber Company, Limited.

Its aim is, in brief, to make Australia independent of supplies from outside sources so far as manufactured rubber goods are concerned, and the company hopes to merit the hearty support of all Australians towards achieving this worthy objective.

### Who———?

"I am the foundation of all business. I am the fount of all prosperity. I am the parent of genius. I am the salt that gives life its savour. I have laid the foundation of every fortune. I must be loved before I can bestow my greatest blessings and achieve my greatest ends. Loved, I can make life sweet and purposeful and fruitful. I can do more to advance a youth than his parents, be they ever so rich. Fools hate me; wise men love me. I am represented in every loaf of bread that comes from the oven; in every train that crosses the country; in every newspaper that comes from the press. I am the mother of Democracy. All progress springs from me."

"Who am I?" "What am I?" "I am Work."—"Cummins and Campbell's Monthly Magazine" (Townsville, North Queensland).

### Country Correspondence Pupils—High Percentage of Scholarship Passes.

Nineteen candidates of the State Correspondence Primary School passed this year's State scholarship examination, and, as that school presented twenty-seven candidates, its average percentage of passes was in excess of the percentage obtained by the State schools generally.

The Minister for Works and Education (Mr. R. M. King) has expressed his satisfaction at this result, and pointed to another very pleasing feature of the work of the Correspondence School. It was that two scholarship candidates—one from the South-west and the other from the Central district—each of whom had joined the Correspondence Primary School at its inception seven years ago, and had passed through it from its lowest grade of the first class, had been successful. In the seven years they had covered the whole range of primary school work, thus demonstrating that they had made progress quite as rapidly as pupils attending the ordinary State schools. "The objective of the State Correspondence School is to pass its pupils through all the grades of primary instruction to the secondary school standard," said Mr. King, "and that objective is being achieved."

### Commercial Aviation in Australia.

With the idea of stimulating interest in aviation in Australia along the lines of privately-owned aircraft, the Shell Company of Australia has purchased a modern triple-engined machine with which it expects to carry out useful exploratory and experimental work. The machine will show the latest development in aeroplane construction, and will, it is expected, be the only one of its type in Australia.

The flying operations of the company will be in charge of Captain E. F. Jones, M.C., D.F.C., who has resigned the position of Deputy Controller of Civil Aviation to take over the work. Captain Jones has had lengthy experience with flying operations, both military and civil. He served with distinction during the war as Flight Commander with No. 3 Squadron A.F.C. On his return to Australia, he joined the Australian Air Corps which formed the nucleus of the present R.A.A.F. When the Civil Aviation Branch was formed, he was appointed to the position of Superintendent of Flying Operations. Captain Jones's cross-country flights in Australia date from 1921, when he flew from Melbourne to Derby via Perth, and then back to Melbourne again. A little later he made the first journey to encircle the Commonwealth in a land type of machine. He is remembered, too, as making the flight with Colonel Brinsmead to Darwin to meet Cobham on his arrival in Australia from England. More recently, he carried out a flight from Melbourne to Normanton and return in the remarkable flying time of 36 hours, taking only four days for the entire trip.

It is anticipated that Captain Jones's appointment to this charge of the flying operations of the Shell Company will usher in a period of extensive activity in that company along the lines of industrial aviation.

### Banana Grades in Victoria.

According to a Press message (25th June, 1929) from Melbourne new regulations governing the grading of bananas have been approved by the State Executive Council. The regulations fix four grade standards for Cavendish bananas. The first grade, described as "special," must consist only of sound, clean bananas of a minimum length of 9 in. and a minimum circumference of 5 in. The next grade, described as "choice," must consist of clean, fresh fruit of a minimum length of 8 in., and a minimum circumference of 4¾ in. Bananas in the third, or "standard" grade, must be not less than 6½ in. in length and 4½ in. in circumference. The fourth, or "plain," grade must consist of fruit of a minimum length of 5½ in., and a minimum circumference of 4 in. When bananas of any grade other than Cavendish are sold in any parcel, the bananas must be marked plainly to show the varieties included.

### Increased Dairy Production.

Speaking at the recent Butter and Cheese Factory Managers' Conference, Mr. M. Wallace invited attention to the question of increased production. This question was sometimes viewed, he said, from an oblique angle. He stressed the necessity for greater efficiency in the direction of obtaining greater production per cow. There was no country in the world where the conditions were always favourable for dairying, and unless they were prepared to accept the role of waiters upon Providence, they must mitigate unfavourable circumstances by making preparations for bad times. The factory managers should exert themselves to stimulate their suppliers in regard to providing fodder reserves, so that milk production would be maintained throughout the year. While the return from the exported surplus of butter did not on present prices, and on the basis of the average production per cow, offer tempting prospects, the position would be entirely altered if they could produce 3 lb. of butter for every 2 lb. now yielded, without increasing the cost. It was no exaggeration to say that this was possible.

### Synthetic Wool.

Of an exhibition in London of articles made from a mixture of wool and synthetic wool, by Textiles (New) Process, Limited, the company holding the world rights of the artificial product known as N.T., an English paper said:—"By using the N.T. as an admixture, it will be possible, it is hoped, to lower the cost of the raw materials used in a wide range of woollen textile productions by 35 per cent., and in certain cases by an even greater amount. Actual manufacturing tests are claimed to have proved that the artificial product, the basis of which is a waste vegetable material, dyes equal to wool, is as durable as wool, and washes in the same way, and with the same results. It can be spun in counts up to 95 mm., and woven by existing woollen machinery. In this respect it differs from artificial silk, as well as in the fact that operatives do not have to undergo a special training before they are accomplished in its use. If the claims made for the new product are realised, they should prove as advantageous to this country as the discovery and manufacture of artificial silk. In the same way as the prosperity of the artificial silk industry has favourably affected the demand for real silk, so an artificial wool, which passes the most exacting tests, should increase the demand for wool."

### A Reminder about Leaf Curl.

The disease known as leaf curl affects various stone fruits, but it occurs mainly in the peach, and in seasons favourable to its development the question of how to deal with the condition is a matter of frequent inquiry. Unfortunately, by the time the disease has made itself evident, it is too late to do anything. Leaf curl is caused by a parasitic fungus, and if it is to be avoided the grower must spray his trees with a fungicide spray in the winter, before the swelling of the buds.

Lime-sulphur, Bordeaux mixture, or Burgundy mixture should be applied at winter strength. If desired, miscible oil may be added to Bordeaux, thus making a dual-purpose spray.

It is most important that the trees be sprayed prior to swelling of the buds. Later applications are of absolutely no value in control of this disease; moreover, these sprays themselves may cause defoliation of peach and nectarine trees if applied after the setting of the fruit.

If the disease is observed to have caused serious defoliation of the trees through failure to spray at the correct time, the new growth of leaves may be facilitated by a light application of a quickly acting fertiliser such as sodium nitrate.

## Imperial Bureau of Soil Science.

The Imperial Bureau of Soil Science (one of the eight bureaux the formation of which was recommended by the Imperial Agricultural Research Conference of 1927) commenced work on the 1st May at the Rothamsted Experimental Station. Sir John Russell, Director of Rothamsted, is also the Director of the Bureau, and Dr. A. F. Joseph, lately Sudan Government Chemist, has been appointed Deputy Director. The functions of the bureau include the collection and distribution of all research work on soils of importance to the British Empire, the assistance of research workers in the prosecution of their investigations in whatever ways it can, the bringing together of workers from different parts of the Empire (either by correspondence or in conference) interested in the same subjects, and to supply information generally which may facilitate the work of soil experts in the development of agriculture.

It is hoped that before long the bureau will be in close touch with all soil investigators of the Empire, both at home and abroad, and that by means of information circulars and other methods the results of studies carried on in one part of the Empire will be made available for all. Arrangements will also be made to supply information dealing with soil investigations in foreign countries, the results of which (owing to language or other difficulties) are not readily available.

## Queensland a Tropic Wonderland—Southern Visitors Impressed.

The newly-appointed Director of the Australian National Travel Association (Mr. C. H. Holmes), who is paying an unofficial visit to Queensland, in company with the Director of the Victorian Government Tourist Bureau (Mr. Gollan), has informed the Press that a commencement would be made this month on the detailed work of advertising Australia with the object of attracting a greater number of investors, investor-settlers, and tourists, as well as dissipating the colossal ignorance which exists overseas regarding our country.

"Although I have travelled extensively, particularly in the far North," remarked Mr. Holmes, "I never realised until this visit that within forty-four hours of comfortable travel from Melbourne, and twenty-six hours from Sydney, where there are over 2,500,000 people, the visitor can not only be transported into winter sunshine, but can enjoy a tropical wonderland of fruits and vegetation. Yesterday I saw the palm grove on the coast side of Tamborine Mountain. I am told that but a small percentage of Queenslanders have been there, and that the vast majority of visitors to the mountain miss seeing this remarkable grove of giant palms and enormous crow's-foot, elms, and other unique trees, shrubs, and ferns. In my opinion, it is superior to anything of the kind in other parts of this State, and is worth travelling across a Continent to see. This grove, together with the tropical fruit areas within easy distance of Brisbane, and others further North, in the Nambour area, have much impressed me from a tourist point of view. These are the features the Southerner and the overseas visitor are most anxious to see, although, perhaps, they may be commonplace to Queenslanders. From Tamborine Mountain, I saw a golden beach with rolling surf. Mr. Harold W. Clapp told me he thought it one of the finest surf beaches in Australia, and possibly in the world. To-morrow I hope to see it at close quarters.

"The popular conception down South is that you must travel to the far North to enjoy the tropical presentations I mention, that it costs much money and much time, and with many the idea of visiting Queensland is thus not further explored in detail. Mr. Gollan shares my view, and he, of course, has close contact with the public. I think that in the Great Barrier Reef—that submarine chain of mountains which scientists tell us is built up of 'little lumps of animated jelly'—Queensland possesses one of the wonders of the world. If exploited, the reef should prove one of the greatest tourist features of Australia. Some day, perhaps, seasonal encampments, or hotel accommodation, will be erected on the reef, so that tourists may visit this unusual and scenic area. The Australian National Travel Association, in which Mr. J. W. Hayes is seeking to interest Queenslanders, will be in a position to materially help this amazingly interesting State. It will take a broad survey of the whole of Australia, and then proceed to classify travel for advertising overseas, both in a broad way and in detail. The association will also seek to co-ordinate effort in Australia as between the various entities interested in travel. In the past, I suggest that too many matters have been left to the Government. This project, although supported by Governments, is not in any way subject to Government control. It is a job entrusted to business men to carry out as they see fit. Here is an opportunity for Australians to co-operate and do something for themselves in a business-like way. Australia," concluded Mr. Holmes, "has done something for all of us—let us do something for Australia."

### What is a Dairy Herd?—An Important Ruling.

What constitutes a dairy herd of forty cows was a point raised in action before Mr. Justice Mocatta and a jury at the Grafton (N.S.W.) District Court recently. The action was for a breach of a share farm agreement, alleging failure to keep the plaintiff supplied with at least forty milking cows. For the plaintiff it was said that the defendant never gave the plaintiff forty cows, except for three months, when she had fifty-two. Sometimes she had only twenty and twenty-four, and as low as eighteen. The defendant contended that he supplied the required number of cows.

For the defendant, it was said that in a dairying district the term "dairy herd" had a certain recognised meaning. His Honour thought the words "dairy herd of forty cows" meant forty cows capable of being used as dairy cows for milking purposes.

Counsel for defendant contended that a dairy cow was a dairy cow whether it was milking or not, the same as a peach tree was a peach tree although it might not at the particular date be bearing peaches. His Honour said the agreement stipulated for a dairy herd of forty cows, and it obviously meant that cows in milk should be provided during the period of the agreement.

This could not be taken to mean that the plaintiff should be supplied with forty cows in full milk every day of the year.

His Honour said that was what the agreement implied. If the defendant made such an agreement, that was his lookout. He did not see how it could be put any other way. A non-milker could not be used as a dairy cow.

Lengthy evidence was given, and the hearing occupied the best part of two days. The jury returned a verdict that in view of the judge's interpretation of the agreement, they found for the plaintiff, damages being assessed at £40.

### Bristol Boys for the Dominions.

H.R.H. Prince Arthur of Connaught visited Bristol, England, on 9th May to open a commodious hostel in which forty boys are to be in residence for training for farm work in Australia and Canada. A nine to twelve weeks' training course is projected, so that 120 to 160 boys and youths will be sent out each year.

This scheme has been launched by the Bristol Migration Committee, which has the Lord Mayor at its head, and which, with the co-operation of the City Council, will be able to train the boys on the Corporation Farm of 300 acres. It has a herd of cattle ranging from 60 to 100, sheep, horses, a big herd of pigs, and about 800 poultry. The boys will be taught to adapt themselves generally to farm life.

In addition to the hostel the committee are using Cabot House—reminiscent of that Sebastian and John Cabot who sailed from Bristol to discover North America—and here the boys will learn carpentering, boot repairing, and clothes mending, and be generally taught to become handy men.

His Royal Highness, in opening the hostel, said:—

"It furnishes an example of what can be done by wholehearted co-operation between all sections of the community. I am glad to know that the hostel has been generously supported by the City Corporation and by the Government. From my personal knowledge of the Dominions, I am certain that they offer great opportunities to British boys. At the same time, it is vital that boys going to the Dominions should be tested and prepared for the new life they are to live out there. The testing and the training which will be given at this hostel will undoubtedly stand them in good stead.

"Just over 400 years ago the citizens of Bristol equipped Sebastian Cabot to sail from this port on a voyage which is famous even in your famous annals. They did better than they knew, for, though the voyage showed no commercial profit, it was the first practical step towards founding our Empire overseas. (Applause.) I believe Cabot took with him five cabin boys from this district—no doubt, boys of similar ages to those I see round me now—and it is, I think, specially appropriate that the Corporation and citizens of Bristol should follow up and consolidate that work by helping their young manhood to maintain the British stock and the British traditions in our great Dominions overseas. (Applause.) I know that these boys will be heartily welcomed there by their kith and kin. They are going to help in the creation of wealth from the fertile land of these new countries, and it is well that their fellow-citizens should see to it that they are properly equipped, as Cabot and his companions were, for the work that lies before them. I wish the boys every success. I would urge them to work hard and play the game, never forgetting their parents, their city, or their motherland." (Applause.)

### The Haunts of Genius.

There is nowhere in the land any home so remote, so humble, that it may not contain the power of mind and heart and conscience to which nations yield and history submits its processes. Nature pays no tribute to aristocracy, subscribes to no creed or caste, renders fealty to no monarch or master of any name or kind. Genius is no snob. It does not run after titles or seek by preference the high circles of society. It affects humble company as well as great. It pays no special tribute to universities or learned societies or conventional standards of greatness, but serenely chooses its own comrades, its own haunts, its own cradle even, and its own life of adventure and of training.—The late President Wilson.

### Britain's Best Customers.

Our best customers are our own fellow subjects, says the "Morning Post" (London). For example, out of exports valued at £723,000,000 last year the Empire absorbed £327,000,000, or 45.5 per cent., which is an increase of a third over the pre-war average. More than that, of our fully manufactured exports, the Empire now absorbs 50 per cent. Canada, dominated as she is by the proximity of the United States, last year bought from us goods to the value of £34,300,000—which is three-quarters of what the United States bought, though the population of Canada is to that of her mighty neighbour as one is to thirteen. Australia is a better customer than the Argentine, New Zealand than Denmark, and South Africa than Brazil. The population of Australia and New Zealand is, roughly, seven millions and a-half; yet last year those two Dominions bought from us greater value of goods than all South America, or all Central Europe, or France, Belgium, Italy, Spain, and Portugal together. Surely those are facts that are more material to our workers even than to our capitalists.

### Cleanliness in the Dairy.

As the great majority of the defects of milk and dairy products arise through lack of cleanliness, it is well to recognise just what cleanliness involves. If the cleaning is to be effective, the dirt must not merely be completely removed, and the organisms present must not only be killed, but care must be taken that no fresh organisms are introduced.

The main object in cleaning is to get rid of the bacteria, and as these are usually embedded in the dirt, the first step is to remove it. In doing this the great majority of the organisms will be removed as well, while the few which remain will be prevented from multiplying owing to lack of nutrition. In order to remove the dirt, which in the case under discussion consists of the constituents of milk, it must be dissolved, and at least loosened by the use of hot water. The water should not, however, be used too warm to begin with, or the proteins will be rendered insoluble. By the use of soda the casein is dissolved, and the fat is emulsified. Soda also acts as a poison to bacteria. Lime is to be preferred for cleansing woodwork, because if scrubbed in it will remain for some time, so that its disinfecting action will be prolonged, and it will fill up the pores of the wood and render the surface smooth and firm. The cleaning process must always be finished by a thorough rinsing with plenty of hot water, either pure or containing one of the chemicals mentioned, or dissolved dirt will remain behind.

Tinned or other metal vessels or utensils should, if possible, be boiled or steamed as a final treatment, thus ensuring an extra sterilisation and rapid drying. If they are dipped it is absolutely essential that the water be actually boiling, and they should be immersed for three minutes if the process is to be thoroughly effective. The last point is very important, for in spite of all reasonable care absolute cleanliness and sterility are seldom achieved, but if only the vessels dry as soon as possible no new growth will develop in them. Wherever possible, the best use should be made of direct sunlight, which both dries and sterilises.

What has been said as applying to utensils, piping, &c., applies equally well to the cloths and scrubbing brushes used in cleaning. These must be thoroughly cleaned and finally scalded with boiling water and dried to prevent them becoming slimy. Every dairyman should clearly understand that cloths and brushes may do more harm than good if not perfectly clean.

It is well known that cleansing cannot be effective if the vessels have inaccessible corners or rough surfaces; frayed woodwork or rusty pails should therefore not be tolerated. To thoroughly clean woodwork it is as well to sometimes wash it with commercial formalin diluted with twenty to forty times its bulk of water.

Plenty of hot water is essential in the dairy, and in this connection the installation of an ordinary domestic bath heater can be strongly advocated.

### The Function of Science.

The truth is that there never was a time when one man could know all that was known about his world, writes Dr. Charles Singer in the first number of "The Realist." In this respect our age is even as other ages were, and it is sheer illusion to suppose that it differs from them in this regard. Nor is the advance of science to be measured by the vast accumulation of observations, but by the degree to which these observations are brought under general laws. The function of science is to classify, which is to simplify and ultimately to unify. It is just by its success in unifying our conceptions that the state of a science must be judged.

### Where are the Great Men?

Apart from mere contemporary celebrity, which may be a very transient affair, nothing is more hazardous than to nominate claimants to greatness. The people who make most noise in the world are seldom the people who get the permanent crown. Copernicus changes the whole thought of mankind about the universe and man's place in it, and goes his way like an unknown straggler from the stage. Shakespeare dies at Stratford without anyone suspecting that the very age would be known as his, and would owe its transcendent glory to him. And it is quite on the cards that when our posterity of 2029 look back to our days it will discover that we "entertained angels unawares" in poets, thinkers, scientists, whose greatness has to be seen in perspective before it can be recognised.—A. G. Gardiner, in the "Star" (London).

### Care of Tomato Seedlings.

After tomato seedlings have reached about 1½ inches in height they should be thinned out in the rows to at least 1½ inches apart. This gives the plants ample room to develop sturdy roots and leaves, and prevents their growing too high. Thinning out also allows good circulation of air between the plants. All weeds should be removed during all stages of growth.

In the hot-bed, with its high humidity, there is always danger of late blight developing. This can be prevented by spraying with Bordeaux mixture. In the case of seedlings a very weak spray (1-1-20) is used, as a stronger mixture may injure the foliage at this young stage. Spray injury may also be caused by the spray having an acid reaction. This can be tested with blue litmus paper, and the defect can be corrected by adding more lime.

Next to blight, the most important disease to combat is spotted wilt. This disease has been proved to be due to the action of a parasitic virus. The infection is present in the sap of diseased plants, and is transferred to other plants by insects, such as thrips and aphides. Any diseased plants should be destroyed, and regular spraying with a nicotine solution is recommended to control the insects. Other contact killers, such as soap and kerosene emulsion, can also be used for this purpose.

### Points in Handling Citrus Fruits.

It is not sufficient to grow good fruit—it must be so harvested, handled, and packed that it is still good when it reaches the consumer. The rot organisms that gain access through a broken skin quickly cause decomposition. Following are some precautions it will pay the citrus grower to keep in mind:—

1. Clipping of the fruit is advisable, but it must be carefully done so as not to leave a stem, which in the course of a few days dries and punctures the adjacent fruit.

2. Do not drop the fruit into the picking bag, but place it carefully, and pour it carefully from picking bags to boxes. A properly designed picking bag or "apron" should be used, which can be filled and emptied with the minimum of damage to the fruit. The boxes should be carefully examined, and all grit and protruding nails removed.

3. Do not jolt the fruit over rough roads.

4. Grade carefully for quality, and market in strict accordance with the grading regulations.

5. See that the sizing machine is working properly, and that none of the fruit is too tightly squeezed or jambed.

6. Use a good clean case.

7. Pack neatly and tightly and fairly high, thus ensuring a full case when the buyer receives it.

8. Stack cases on their sides.

## No Shorter Hours for Leaders.

The higher men climb, the longer their working day. And any young man with a streak of idleness in him might better make up his mind at the beginning that mediocrity is to be his lot. Without immense, sustained effort he will not climb high. And even though fortune or chance were to lift him high he would not stay there. For to keep at the top is harder, almost, than to get there. There are no office hours for leaders.—Cardinal Gibbons.

## Sheep Classing—Points for Small Flock Owners.

The grading of the breeding flock and selection of the sires for use in mating is a regular part of the practice on large properties. Better flocks mean bigger returns, and even the small flock owner is recommended to class his ewes at least to the extent of culling out all the low-grade animals.

The best time to class the flock is just prior to shearing, as the sheep are then carrying full evidence of their value as producers of wool. In flocks which are used primarily for fat-lamb production, size of frame, roominess in girth and hindquarters, good milk-producing qualities, and early maturity are points of importance, and all ewes lacking these qualities to any extent should be eliminated from the breeding flock. At the same time, these being days of good wool prices, the wool side must not be lost sight of, as a ewe can raise a satisfactory fat lamb and still produce a payable fleece of wool.

The small flock owner who is breeding for wool should have in view the sheep that will grow the type of wool most payable and best suited to the district, and in this connection he will find the views of those with longer local experience helpful. Having fixed a certain ideal in his mind he should strive each year when classing his sheep to bring the flock a little nearer to it by culling out all ewes that vary greatly in any of the essential qualities. The important qualities to consider are a well-shaped frame, considering the type and breed, good legs (not crooked), and wool of the desired quality (fineness) and as even and dense as possible all over the body. With regard to frame, shapeliness of carcase is not quite so important in the Merino as in the mutton breeds.

The most common faults are small, undersized, or weedy frame, a dip behind the shoulders called "devils grip" (a sign of weak constitution), narrow shoulders or hips, and crooked legs or feet. Common faults in the wool growth which should also be avoided are unevenness over the body, lack of density or length, and dulness or dinginess in colour due to too much condition or to an undesirable type of yolk.

As soon as the teeth become faulty it is as well to cull such sheep out on account of age. The class of country and the amount of risk the owner is prepared to run if a dry season follows will decide at what stage it is wise to cull for age—aged ewes, especially if in lamb, are naturally the first to feel the pinch under dry conditions.

Each year the ewe hoggets will come up for inspection, and here judgment is required. As many as one-third of the ewe hoggets are culled each year on numbers of station properties. This keeps the flock at a high standard and allows for a percentage of the cull hoggets to be fairly attractive and worth good prices in the market as breeders.

The fact that the ewes are rearing lambs must be considered when classing; ewes with lambs at foot cannot be expected to be in the pink of condition, and should not be culled because of lack of condition alone. If hoggets have encountered severe conditions after being weaned they may not be well grown, and it may be advisable to hold them for a while before passing judgment. When ewes are culled for any reason except for age, a distinguishing mark should be put in the plain ear so that they can be easily recognised in the yards and on no account should they be bred from, as their faults are likely to be intensified in the progeny. The wisest plan is to try to fatten all the culls and dispose of them to the butcher at the earliest opportunity.

In a flock of comebacks, if breeding for wool, the procedure would be similar to that described, except that care should be taken that the size of frame necessary in a sheep of this type is not sacrificed to the production of a superfine class of wool. If the comeback flock is used for lamb-raising, the points mentioned earlier (roominess of frame, milk production and early maturity) need to be considered.

These remarks concerning frame and conformation apply also to a crossbred flock, but to a lesser degree. The main consideration in regard to the wool is to make the flock as even as possible; but because of the greater value attaching to the finer classes of crossbred wool, it is advisable to cull the coarser-woolled animals.—A. and P. Notes, N.S.W. Department of Agriculture.

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### HOW TO KEEP BABY HEALTHY IN WINTER.

In the year 1927 there occurred in Queensland during the first year of life 111 deaths from respiratory infections, chiefly bronchitis and pneumonia. These deaths were preventable. Most, if not all, of them followed on a "common cold."

The number of births in Queensland every year is very nearly 20,000. Probably thousands of these babies suffer from "common colds" during the first year of life. Usually these "colds" are slight though troublesome ailments in babyhood, but in babies they are followed more frequently by serious or fatal complications than at other ages. What can be done to diminish the present mortality from this cause?

#### A "Common Cold" an Infectious Disease.

(1) A "common cold" is an infectious disease. The baby always gets it from some other person. Usually this other person is suffering from a "cold," but not always. The infective germs may be present in persons who are apparently quite well. They are "carriers" of the disease. Or these persons may have been nursing or fondling some other child who has a cold and may carry the germs in their clothing. Obviously the more persons are allowed to handle, fondle, or kiss the baby the more likely he is to be infected. The baby with many relatives, more sentimental than wise, and the baby whose proud mother likes to hand him round to visitors for admiration runs extra risks. Taking a baby into a crowded room or hall, often unventilated—a picture show, for example—is a fairly sure method of insuring infection. No sensible, well-instructed mother, who loves her baby, would do such a thing.

While these sources of infection should certainly be avoided, there are others in which prevention is not so easy. The older children often catch "colds" at school, and it is not easy then to keep them away from the baby, but it should be done. The father also, when so suffering, should keep at a distance. But if the mother gets a "cold," the baby's chance of escaping infection is much smaller. Therefore nursing mothers should be particularly careful not to catch "colds" from other people. Should they get one they should not kiss or cough over the baby. They should hold a handkerchief over their mouths when coughing, and carefully wash their infected hands before touching the baby. It would be a wise precaution to wear a gauze mask or tie a handkerchief over face and nose while suckling. There are some bad habits that actually force the germs which may be present in the mother's mouth into the baby's mouth—for instance, blowing on the baby's food to cool it, or tasting it from a cup or spoon, which is afterwards used by the baby. We have even seen mothers put the baby's dummy into their own mouths, and then into the mouths of their helpless babies.

#### A Kiss, a Cup, or a Cough may mean Death to the Baby.

(2) If a strong, healthy baby catches a "cold" it is not usually a serious matter. A healthy, breast-fed baby will probably shake off a "cold" more quickly than a healthy-looking, bottle-fed baby. A poorly-nourished baby finds it still more difficult to do this, and is more likely to develop complications. Therefore the mortality from respiratory infections would be less if all babies were breast-fed. Let every mother keep her baby as strong as possible. It is the weakly, under-nourished, or new-born babe who most easily dies from a simple infection. The danger rises to its greatest height in premature babies, these frail beginnings of life. For them death may lurk in a kiss, a cup, a cough.

#### Prevention Better than Cure.

(3) A baby with a "cold" may not appear seriously ill, but he is not well. Take care of him. He may be a little feverish and thirsty; then give him plenty of boiled water to drink, but less milk or other food. Unless you do this he will probably

suffer from indigestion and loose motions. Let him have plenty of fresh air, but keep him sufficiently covered. Babies suffering from "colds" are susceptible to chills, which may bring on bronchitis or pneumonia. If he is not feverish he may be taken out into the sunshine, provided he is sufficiently clothed and not exposed to a cold wind. One complication of a "cold" is earache. Suspect this if the baby cries from pain and puts his hand up to his head. For earache, bronchitis, and pneumonia medical treatment is necessary; but prevention is far better.

## KITCHEN GARDEN.

Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top-dressing, where vegetables have been planted out with fine stable manure, has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

## FLOWERING SHRUBS.

*Lagerstræmia indica* varieties.—There are many beautiful forms of this shrub on the market, and the finest varieties have been raised in Queensland—*L. Matthewsii* and *L. Earesiana;* the colours of both are lilac, but *Matthewsii* is the darker shade. The heads of bloom of both varieties attained a length of about 24 in., and the individual flowers are a couple of inches across. The plant may be grown in any small garden, and the size may be kept at the will of the gardener. Specimens growing in Brisbane range from a few feet high to 20 ft.

The plant stands severe trimming; in fact, it stands the knife so well that it can be grown almost any height by being cut back in July every year, like a grape vine. One of the finest specimens of *L. Matthewsii* can be seen growing on the river side of the Customs House garden. Plants are easily raised from cuttings taken from the previous year's wood and planted during July and August. Also plants well established may be purchased at any of the nurserymen's stores.

Gardenias.—In the earlier days of Brisbane there were few gardens without a gardenia; now they are rarely seen. *G. Thunbergii* is one of the varieties that should be grown. The flowers are pure white, exquisitely scented, and the foliage of all the varieties are a glossy green. These plants are not too fond of pruning, and should be allowed to grow in their own way. *Gardenia florida* is mostly grown for florists' use, the flowers being perfect in form and not having the heavy perfume of the other varieties. All the gardenia family are subject to scale diseases, but are easily kept clean by occasional sprayings with boiler water that has plenty of soap in solution. The plants never attain any size, so are very useful in small gardens.

Oleander.—In the northern part of the State these plants flourish, and are much admired by visitors from the Southern States and overseas.

The plants attain a fair size if not kept within bounds. In some of our northern towns it is quite common to see plants 20 to 30 ft. high, and of many colours. The plants are grown in Brisbane, but by a few only, yet they grow just as well here as in the North. The smaller growing varieties should be more extensively grown, and the pink "Carnea," white "Madonna," and carmine "Delphine" are all good old varieties.

When growing the plants in small gardens it is necessary from their earliest stages of growth to keep them well headed back, the young wood of the previous year being the flowering wood.

Lantana.—The small varieties of lantana are not in common with the pest scattered all over Queensland, and are very beautiful when trained as hedges or shrubs. The tangerine coloured variety and the canary yellow variety are the two usually grown in Southern Queensland. Splendid specimens of these are growing in the Botanic and Museum gardens. The plants flower for nine months of the year, and will grow in almost any soil and will stand fairly hard conditions.

PLATE 41.—A COOKERY CLASS IN A TRAVELLING DOMESTIC SCIENCE SCHOOL.

To provide the advantages of vocational training to Queensland children in isolated centres far beyond the influence of Technical Colleges and Rural Schools, fully equipped schools on wheels have been constructed, and this is a typical interior.

*Photo.: Dept. of Public Instruction.*]

PLATE 42.—SWIMMING IS TAUGHT REGULARLY IN QUEENSLAND SCHOOLS BY EXPERT SWIMMERS.

This pool at a country school is a popular corner of the playground. Other baths, particularly in the cities, are far more elaborately constructed and appointed, but none could give greater enjoyment to these healthy young Queenslanders.

## FLOWER GARDEN.

All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually, it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragons), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, paneratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm, moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07, increasing gradually to a rainfall of 7.69 in. in February.

## LANDSCAPE GARDENING.

The landscape gardener must possess a good deal of artistic taste, as he deals with the landscape and its improvement. Should alterations be necessary, they must be carried out in as natural a manner as possible, and they must be in unison with the surrounding country. Any existing natural features may be made the most of.

If trees shut out a desirable view, they may with care be removed. Tree thinning also becomes necessary when some are spoiling others. It is better to have one good specimen than several poor ones. When tree planting, the gardener must look forward, and consider their size when maturity is reached.

Broad stretches of lawn may be broken up with shrubs or specimen trees, or beds of flowers. The character of the soil and the situation must be taken into consideration when planting. It is of no use to plant trees or shrubs that are not likely to succeed, and if doubtful ones are included they must be in positions where they can be easily replaced should they fail. The character of the dwelling must also be taken into consideration.

Vista making is an important part of landscape gardening, and to carry it out the various points of vantage have to be ascertained and their values determined. The outline of the landscape from the various vantage points must be undulating, not straight or unbroken, and though special hues in greenery may be made the most of, they must not be repeated until the eye wearies of them.

Paths should be as few as possible, and each should be made for some definite purpose. They should run in bold but graceful curves, especially when made of gravel.

If summer houses are included they should not stand out aggressively, and they should be covered with creepers as quickly as possible.

## TRANSPLANTING FRUIT TREES.

The transplanting of partially developed fruit trees is seldom attempted on account of the risk of failure and the trouble entailed in endeavouring to retain sufficient fibrous roots to ensure a reasonable prospect of success. Trees up to five or six years old, where subject to the necessary preliminary treatment, can not only be removed without risk of failure, but transported satisfactorily over long distances. It will be recognised that the sustenance of the plant is absorbed by the small or fibrous roots in the immediate vicinity of their terminals, and by inducing a profusion of these within a short radius of the stem the chances of failure are practically nil. A profusion of small roots may be ensured by cutting through at the desired distance from the stem (15 to 24 inches, according to the size of the tree) all roots to a depth of 18 inches. In so doing a trench is made around the tree, and the ends of roots carefully pared if the cutting has not been "clean." The trench is then refilled with soil containing a good supply of humus, and in about three months' time the original root ends will have developed a good supply of fibres. At the time of removal these are not interfered with more than can be avoided, the necessary excavation for removing the tree from its original position and severance of any lower roots being made beyond the terminals of the young root growth. The head of a large tree should be materially shortened at the time of removal. The cutting of roots in the first instance should be performed when the tree is in a dormant state; in the case of citrus, conditions are generally favourable about March. Tropical varieties handled in this manner can be removed at almost any time after sufficient roots have formed and hardened, and may be first treated at any time of the year at the period known as "between growths."—GEO. WILLIAMS, Director of Fruit Culture.

# TWELVE BEST GARDEN ROSES.

*(Continued from the June Journal.)*

Following is the continuation (abridged) and conclusion of the paper read by Mr. B. Watkins, M.Sc., president of the Horticultural Society of Queensland, before a recent meeting of that body:—

## The Maman Cochet.

In a review of this kind it would be unkind to omit to mention that once famous and even now popular tea rose, Maman Cochet, which appeared in 1893. It constituted a milestone in rose progress in its day, and was looked upon as an epoch-making variety. Its ability to grow and flower under the most adverse conditions without care or cultivation is a strong point in its favour; in fact, too much attention results in coarse, double-centred blooms. Left to itself, it produces blooms of ideal exhibition form of a deep flesh colour with a suffusion of light rose.

I venture to say there is no variety to-day with more first prizes to its credit than this rose. It still continues a prominent variety on the show tables, together with the white sport of later date. Occasionally, owing to its thin petals, it does not open well. The climber is an exceptionally vigorous grower, and abundantly free in bloom.

## Pink Varieties.

Among the vigorous pink varieties there is one more rose of distinction, Countess of Gosford, a beautiful salmon, practically the first rose sent out by the now well-known firm of S. McGredy (1906). This is a variety not grown by everyone, but it merits this distinction. Had it a few more petals, resulting in a little more fulness, and consequently increased lasting powers, it would be in universal demand. Nevertheless, owing to its free and continuous blooming propensities, its strong, branching growth, and disease-resistant powers, it can be strongly recommended. If one can catch it at the right moment it is valuable for exhibition purposes, but owing to its rapid opening it usually disappoints the exhibitor. A fine bud in the morning is a full-blown rose by evening, even if gathered and put in water. As a decorative bush for the garden it is excellent. Further, it is the most satisfactory rose to grow as a standard in Brisbane. This type of rose is not considered to be a success here, but to those who desire a really good rose on a standard stock I recommend this variety. It makes a wonderful head, bushy and symmetrically round, and blooms just as well in this form as in the dwarf form.

The pink varieties already discussed are vigorous growers suitable for back row positions, but there are several meritorious pinks which demand attention, though not such tall growers as those already discussed. I call to mind the following:—Ethel Somerset, the best of these; Madam Butterfly and her sports; Madam Jules Grolez; Mrs. Bryce Allen; Una Wallace; Rose Marie; and Madam Segond Weber.

In concluding the review of the pink varieties, I should like to bring before you the claims of a rose which I have often exhibited here with success. This rose is Priscilla, a deep pink of faultless exhibition shape, and is known to a few of our members. It was sent to me for certain tests by Hazlewood Bros., but is considered by that well-known firm to blue so badly as to remain unlisted. Whatever may be its tendency to blue under southern conditions, the same does not seriously affect it here, and I make bold in saying that were it known here it would be in everyone's garden, and one of the chosen twelve. However, I do not intend to elevate it to that distinction at present.

## Yellows and Apricot Shades.

The third colour class to discuss are the yellows and apricot shades. There is no deficiency of roses in this colour class, but there is a deficiency of really good garden yellows for Brisbane conditions. The greatest fault to be found with this class is the tendency to fade, and in fading to spoil and turn dirty. A yellow rose which fades evenly is not so bad, but when such roses blotch and become dirty in patches they are far from æsthetic. We have had many yellows in past times, it being a common enough colour among tea roses. Madam Constant Soupert (peach and yellow), Lady Plymouth, Alexander Hill Grey, Lady Hillingdon, are all yellow teas which have some or other serious fault. The first three ball badly and bleach unevenly. The last, Lady Hillingdon, an exceedingly popular rose, must give way to others. Its greatest fault is that it hangs its head, and although reluctant to see it displaced, I am of the opinion that it is.

There is no question that the premier yellow to date is Souvenir de H. A. Verschuren, which appeared in 1922. It is related to the popular Sunburst, but is a far better rose. I secured it as a novelty, and the identical plant is still a wonder. Colour is deep cadmium yellow passing to lighter shade in outer petals. Fine form, fine perfume, upright growth, disease-resistant properties, and blooms carried on long stems above solid green foliage combine to give us a rose of great merit. It is a particularly free flowerer, and the flowers have solid petals, and last a long time. Just as I do not hesitate about the premier place among the yellows, so too I do not hesitate about second place. In my opinion this belongs to Elegante. This rose appeared in 1918 from the nursery of Pernet Ducher. In colour it is not as deep as Verschuren, being nearer to a clear light yellow self, but it has this advantage—that it fades evenly, and holds its charm in spite of a slight petal deficiency. It is always growing, always in bud and flower. The buds are very long, and when opening give a perfect high-pointed well-formed flower. It is vigorous and disease resistant. I recommend this variety to those who have not grown it.

PLATE 43.—A COUNTRY HOME IN QUEENSLAND.

Dr. J. H. Dalrymple's bungalow, "Homefield," on the Nebo Road, Mackay.

One of the brightest scenes in a district noted for natural beauty is this comfortable home on the outskirts of Mackay. Roofed with green shingles with appropriately toned outlines, standing well back from the roadway, and set in velvety lawns backed with fields of sugar-cane, it represents a type of farm home that we hope to see more common in Queensland. Though complete with every modern convenience, it is yet well within the financial reach of the farmer. Its interior is replete with the latest labour-saving "gadgets," and its design and general layout shows what can be accomplished in the making of a comparatively inexpensive modern country home. Beef cattle and cane are the owner's main interests.

The third rose of note in this section is Mrs. Dunlop Best, a reddish apricot to yellow variety, which, owing to great freedom in growth and bloom disease resistance, makes a valuable garden rose, particularly in a colour class deficient in numbers. This is easily the best rose in its class, and although it is not as full as one would wish, yet the constant blooming ability of this variety assures the grower that he will always have a supply of roses. The above three roses represent the best in each grade of yellow.

In reviewing the remainder one finds that exquisitely coloured and perfectly shaped gem, Rev. F. Page Roberts, which takes all by storm. Had it a little more vigour and less tendency to die back it would sweep all before it. I would advise those who grow it to refrain from pruning, and let the cutting of the flowers be all the pruning it gets, also to give it a well-balanced fertiliser, making sure that

potash is not lacking. Even wood which appears old and spent has the habit of sending out vigorous growth in an unexpected manner. So I say let well alone and you may succeed with it. Strange to say, this variety shows more brilliant colouring in full summer than winter. The rich deep copper of the outside of the petal contrasts in an amazing manner with the fine deep yellow inside. Finally, as to yellows, Souvenir de Madam Boullet, from the nursery of Pernet Ducher, in 1921, will very soon occupy a high position with rose growers. It is certainly an improved Hillingdon in shape and carriage and colour, and if its growth continues good, then it will outclass its rival. I am very impressed by this variety.

I do not think it is too early to predict that the most popular yellow rose a few years hence has arrived amongst us in the Golden Dawn. If such proves to be the case, then Mr. P. Grant, of New South Wales rose-growing fame, will have reason to be proud, and Australian rose-growers will do likewise. Mr. Grant has not withheld the pedigree of his new rose. It is a seedling raised from Elegante and Ethel Somerset. I have already spoken in favourable terms of both these roses, and the progeny is said to combine the virtues to each, to be vigorous, with clean, distinctive foliage and splendid branching habit, so essential to free and continuous blooming. The colour is described as rich sun-yellow, heavily flushed deep old rose.

**Lighter Shades and Whites.**

There is one colour class remaining to be discussed, the light shades and whites. I am not partial towards whites nor light shades, yet I promised to treat each variety on its merits, and consider the following are worthy of attention:—Mrs. Herbert Stevens, Frau Karl Druschki, White Maman Cochet, W. R. Smith, Mrs. Harold Brocklebank, White Ensign, Antoine Revoire, Madam Jules Bouche, K. A. Victoria. Of the above list the best known are Frau Karl Druschki, Mrs. Herbert Stevens, and White Maman Cochet. The first two deserve a place in any plebiscite, and White Maman Cochet, though subject to discoloration and at times coarseness, maintains a high position among rose growers. It is even more vigorous than Maman Cochet, from which it is sported. The climbing form of White Maman Cochet is the most vigorous rose among climbers, and a particularly free flowerer.

Frau Karl Druschki is one of the best known roses in existence. It was sent out in 1900 by Lambert. The story goes that it was rescued from the garbage heap during the annual clean-up of nursery seedlings. Whether such is the case or otherwise, the fact remains that it is grown by everyone, and is a variety which is not over particular as to attention. It has the hybrid perpetual type of growth, sending out long, vigorous canes which need to be tied down to a horizontal position or cut back somewhat. It is the second growth from these canes which develops the flowers, and it is, when once established, a very free bloomer, giving large, pure white, faultless blooms of exceptional exhibition quality. Although it is usually considered to be a hybrid perpetual rose, some authorities consider it among the hybrid teas, owing to its great freedom in flower. It has two drawbacks: It is scentless, and it opens rather rapidly. Yet its virtues are such that it commands well-earned attention on all sides.

Mrs. Herbert Stevens, a tea rose sent out in 1910 by McGreedy, is the most popular white commercial variety to-day. It gives a superabundance of very well fashioned white blooms, with a faint perfume. It is especially free in bloom, every shoot carrying many buds, so judicious disbudding must be followed if exhibition quality is desired. Where such a practice is followed there results a great increase in size and substance, and the blooms are frequently shown on our tables. It has, however, a deficiency of petalage, and thus opens rather rapidly under ordinary garden conditions.

A climbing form is gaining in popularity, and eclipses that once-favoured climbing Niphetos of bygone gardens. Claimed as an improvement upon Mrs. Herbert Stevens, and sent out by the same firm in 1925, is the variety White Ensign. This claim remains in the testing period just now, but one local nurseryman and commercial grower prefers it to its rival, as it is a better bouquet variety, being fuller and lasting longer. I know specimen bushes of White Ensign which are all that could be desired, and my own plant improves month by month. At first it was small in shape and crowded in petalage, but marked improvement is now apparent. The colour in the centre is not white, but more of a lemon yellow.

W. R. Smith and Mrs. Harold Brocklebank always impress in a garden by reason of their powerful solid growth, thick disease-resistant foliage, and freedom in bloom, though each is deficient in perfume. The former, though a remarkably good rose, has a very serious fault, in that its spring blooms are always crippled, coarse, and discoloured, and have no value whatever. It is seen at its best during the

autumn, when it shows up to a wonderful degree with its light-coloured, well-formed, somewhat globular blooms, the outer petals of which carry a delicate blush-pink colour. I cannot urge its claims overmuch, as I consider its behaviour outside the autumn to constitute a serious drawback.

Mrs. Harold Brocklebank, on the other hand, is a consistently good bloomer, giving shapely light-straw, yellow, and pink suffused blossoms continuously, which can claim attention from an exhibition standpoint. It is a very favoured rose in the South, and one which Brisbane growers who like the lighter shades cannot omit. Last of the above colour class is Antoine Revoire and Madam Jules Bouche. The former is a rose which finds many adherents, and appears in the bud to full bloom class on many show occasions. The colour of this rose is exquisite, and as a good bush yields a creditable number of blooms, it is a fine garden rose. It opens out rather flat, but, in spite of this, does not lack charm. It is mildew resistant and upright in growth, though, at times, it disappoints one in this latter direction. It is an old rose, having appeared in 1896 from the nursery of Pernet Ducher, and can justly claim a warm place in the affections of rose growers, for it has been utilised in the production of many favourite roses of to-day—namely, Columbia, Pilgrim, Ophelia, Madam Butterfly, Golden Ophelia.

Madam Jules Bouche, a delightfully shaped, dainty rose of creamy white, suffused pink, is a very consistent bloomer, and a garden decoration at all times. It is of a strong branching habit, and sends up abundant stems from the ground, carrying heaps of characteristic blooms. The characteristic exclamation of people seeing this rose for the first time is, "How dainty!" and this fits the bill perfectly. I would not put it among the premier garden roses, but it is good.

This brings us to the end of our review, and it remains for me to give my lists in order of merit.

First twelve.—Etoile de Holland, Radiance, Red Radiance, Jonkeer, J. L. Mock, Madam Abel Chatenay, Mrs. C. J. Bell, Hadley, Souvenir de H. A. Verschuren, Elegante, Mrs. Herbert Stevens, Frau Karl Druschki, Countess of Gosford.

Second twelve.—Laurent Carle, Lord Charlemont, Star of Queensland, Ethel Somerset, Madam Jules Grolez, Columbia, Maman Cochet, Antoine Revoire, White Maman Cochet, Mrs. Harold Brocklebank, Una Wallace, Priscilla.

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## NOTES ON ROSE PLANTING.

To be a successful grower of roses it is essential to have some knowledge of pruning before planting. Much depends on the planting and pruning to obtain the best blooms.

It is necessary to prune both branches and roots before planting, and if this is not carried out carefully the best results can never be obtained. Some of the suppliers of stock send their plants pruned and ready for direct planting.

In all cases the ground should be well trenched and put into condition before the operations of planting. It is useless attempting to grow roses for the best result unless the work of trenching has been done in a thorough manner, and well-rotted manure has been worked into the ground. The ground must be thoroughly drained so that no stagnant water is allowed to accumulate.

Before the plants arrive from the nursery prepare the place for each variety. Do not mix the varieties. Some are slow growers; others are rampant growers; and it requires consideration in selecting places for the various roses. A general rule is to put the strong growers at the back of a bed and the weaker ones in the front.

The following suggestions may be useful for those who are not well versed in the art of growing roses:—

In the first place, see that you have your beds in the most open and sunny position possible. Rose plants must have space to develop; therefore plenty of room must be allowed for each plant. Many of the diseases of roses can be put down to insufficient sunlight, air, and space, rather than to cultivation faults.

As some roses require skilled treatment and cultivation, beginners, when making their selection of rose plants, should choose those which are easy to grow and which flower well. Tea roses stand ordinary garden cultivation better than any other class of rose.

Any time from now to the end of July is suitable for rose planting, but the earlier they are planted the better. The distance apart is the main consideration. Many growers never allow their rose plants to develop, and keep them on the stunted side. This is all right for the rose exhibitor but no good for the grower of decorative flowers or garden decoration.

In our climate most rose bushes grow into large plants, and such growth encourages greater wealth of flowering wood and consequently more flowers. To do this, the rose plants must not be less than 6 feet apart. Any nearer would be considered close planting, and under such conditions one must cut the heads off plants to keep them within bounds.

If quality and quantity are desired, room must be allowed the plants for root expansion. When planting, always have the union a little below ground, and I would advise 2 inches as a necessary depth under the ground. The advantage of planting the union below the ground is that new roots form from the union, and eventually these roots do all the sustaining of the plant.

Another advantage is that in the early stages of growth the plant has the use of two sets of roots on the one plant. Eventually the brier root dies out, and there is no chance of brier suckers appearing in later years.

In the bottom of the hole to receive the new plants make a small hillock for the even spreading of the roots, which will be with root terminals all down instead of flat or turned towards the surface. Long roots may be carefully cut to suit the size of the hole.

Make the soil firm around the base of the plant, spread soil slightly over the smaller roots, and fill in gradually. Trample firmly, and thoroughly water the plant before finally filling in the whole of the soil. When water has soaked away the balance of the soil can be filled in. No further watering will be necessary for a week.

All that is then required is to keep the ground well hoed. Water every other week, giving a good soaking at each watering.

## VALUE OF EARTH WORMS.

It is evident that not every gardener can decide whether the common earth worm is a friend or foe. Who has not seen the gardener, when digging, industriously remove every worm found?

Now, speaking generally, these creatures are more friends than otherwise, although they are far too numerous in some gardens at certain periods of the year. As a rule, they do more good than harm by allowing water and air to pass through the soil more freely, and in other small ways assist the gardener.

They may do a little harm by working among the roots of seedlings, also, of course, on lawns, bowling and golf greens, where they may be regarded as pests, rendering the use of lime water necessary to eradicate them.

### Slugs and Snails.

Slugs and snails are troublesome in many gardens—in some more so than in others, and if they are not dealt with in some way a good deal of damage may be done during the year.

The value of lime and soot is pretty well known, but both must be used carefully, or the plants it is intended to protect may be damaged. Ashes in a dry state are also effective in keeping them off. In using these insecticides they must be used in lines or around the plants in a dry, powdery form.

If the garden soil is regularly limed and kept sweet there is less chance of the slug increasing. Watering with alum water is also death to snails and slugs.

## PROPAGATION BY CUTTINGS AND LEAVES.

The herbaceous character and free-growing nature of the majority of plants that are used for summer bedding renders their propagation easy. Large numbers of plants are required in as short a time as possible, and without the expenditure of much time or labour, and unless a plant is easily propagated it is of little value in the bedding department.

Autumn propagation is preferred for the more robust of these plants, cuttings at that time being both plentiful and vigorous and the season favourable for the quick production of roots. If the necessary preparation of beds, boxes, and soil has been attended to, the whole of the cuttings may be put in during autumn and rooted before the cold weather comes. It may be laid down as a general rule that all stout, free-growing cuttings prefer a strong loamy soil, while those of a more delicate nature and that have fewer roots are safest when planted in light sandy soil containing a large proportion of leaf mould.

The cuttings should be planted firmly, in rows about 6 inches apart, and should receive a good watering as soon as planted, after which they will require little attention beyond the removal of dead leaves and a sprinkling of water overhead should the weather be dry. As soon as rooted, or at least before the approach of the cold, wet weather, they should be placed in boxes, pans, or pots, in which they are to winter. For smaller quantities it will be found best to plant the cuttings in shallow boxes, in which they may be allowed to remain until the spring.

Pentstemons, phloxes, pinks, antirrhinums, and a host of other bedding plants of robust constitution may be increased in the autumn in this way. Boxes are most convenient for these purposes. The bottom should be pierced with several holes an inch or more in diameter, and covered with an inch of ashes or crocks as drainage, the box being then filled with sandy soil, using loam, leaf mould, or whatever mixture the nature of the cuttings would require.

Under certain conditions buds are formed on the leaves of a large number of plants, such buds being called adventitious, to distinguish them from the stem or normal buds, which are found on all plants, and which are borne in the axils of the leaves. It is supposed that the leaves of a very large proportion of plants possess this power to develop extraordinary buds, and that their failing to do so when tested by the gardener is due to improper treatment rather than to absolute impotence in the leaf itself.

It is, however, only in a few cases that leaf-cuttings are resorted to for purposes of propagation. Such plants as begonias, gloxinias, and a few others of more or less succulent nature are the only ones for the increase of which leaf-cuttings are employed. Numerous other plants have proved capable of propagation by this means, some of them being not at all succulent-leaved, while on the other hand, plants of excessive succulence have proved unable to form buds when tested in the same way. In some cases where leaf-cuttings have been tried, roots were freely developed but no bud was formed. Camellias may be mentioned as plants whose leaves root freely but do not develop buds, although left in the propagating house for several years.

Where it is desirable that a new plant should be propagated as abundantly and as rapidly as possible, it will be found often advantageous to place the leaves that are removed from stem cuttings in the propagating frame and treat as advised below. To anyone acquainted with the nature of the following list of plants, it will be apparent that no rule can be laid down for the guidance of the cultivator, either when based on the texture of the leaves or the nature of the plants. Begonias, clianthus, gesnera, gloxinia, hoya, lilium, watercress, and many others may be propagated by means of leaves or portions of leaves.

Turning now to the plants that are usually increased from cuttings made of leaves, a word may be said on the treatment such leaves require, and the best time of the year for the operation. Gloxinias may be dealt with all times of the year when leaves are available, the most favourable period being autumn. Well-matured leaves should be selected, avoiding those in which the yellowness of decay has appeared. The leaf-stalk may be severed at any point, it being unnecessary to secure them with heel or portion of the stem. The blade may then be divided longitudinally, so that a large leaf would form about half a dozen cuttings. It is, however, better when the blade is cut into sections, each section having a portion of the midrib attached to its base.

Some prefer severing the midrib into about a dozen pieces, leaving the blade intact. In this way a plant is obtained from each portion of the midrib, bulbils being developed on the lower end of each. Where the latter plan is adopted the whole leaf must be pegged on to a pan of sandy soil. If the leaf is divided up into smaller pieces, pots may be used, filling the pots half-full of drainage, and the other half with a light sandy soil. Into this the cuttings must be placed obliquely, so that whilst held firmly in the soil their bases are only a little below the surface. A frame in a propagating house will be the most suitable place for the cuttings till rooted. In a small bush-house a position on a shelf would answer equally well for gloxinia cuttings.

Begonias may be treated as suggested for gloxinias; or, if to be propagated on a large scale, a frame containing cocoanut fibre may be used, pegging the begonia leaves on to the fibre.

Reference may be made to the reproductive nature of some fern fronds, especially the aspleniums, nephrodiums, aspidiums, the fronds of which usually bear buds, which eventually form plants. The requirements of such leaves, when wanted for propagating purposes, are very much the same as those of the plants themselves.

The scales which form lilium bulbs may be used for propagation, as if fresh when gathered and placed in sandy soil they root and form small bulbs capable of growing into large plants.

All these exceptional ways of obtaining a stock of plants are only resorted to in exceptional cases; they are chiefly of physiological interest, showing as they do how nature has provided plants with auxiliary powers for their reproduction, which are held in reserve till called upon by the failure of the normal proper means to fulfil the functions of increase or reproduction.

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## HORTICULTURE IN THE SOUTH.

The following notes have been extracted from a letter from Mr. J. F. Bailey, Director of the Adelaide Botanic Gardens, who was formerly on the staff of the Queensland Department of Agriculture and Stock as Curator of the Brisbane Botanic Gardens:—

Our dahlia display is almost expended, and, as usual, attracted thousands of visitors. Further proof has been given that either for garden decoration or for the show tables the type termed "decorative" outdistances those of any other class. We, of course, had representatives of all the classes, and the dainty collarettes had hosts of admirers.

Several slight variations have recently crept in among the two types of decorative we standardised here for guidance in the framing of show schedules. We thought, therefore, it advisable to reclassify them; and at a meeting recently held, at which were representatives of six societies, definitions to suit the respective types were drawn up. These will be placed before the members of the societies concerned, and when finalised I hope to send you particulars. Without such a guide it is very difficult for judges to make correct class awards.

Some of our local growers have raised excellent seedlings quite equal to many of the high-priced varieties from overseas. Our nurserymen who specialise in this flower are alive to its importance, and keep up to date with the latest American and European novelties as well as those to be obtained within the Commonwealth. I frequently receive inquiries as to the names of a "few" good decorative varieties, and find it difficult to keep down such a list, there being so many of equal merit.

While a good percentage of our recent importations upheld their catalogue descriptions, some of those obtained at a high price were inferior to many of our local seedlings. As some of your friends may like to know the names of those which attracted attention a list is given. Among those new to our collection to deserve mention were:—

Charles Stratton, gold, shaded rose; Renown, purplish maroon, a variety that holds well; Mordella, apricot buff, suffused pink; Grace Curling, lilac pink; Couronne d'Or, colour as suggested by name; King Tut, crimson; Zante, deep gold; Jersey Beacon, scarlet; Boekenhage, pink, with orange centre; Robert Treat, rosy red; Elinor Vandeveer, pink; Leviathan, orange; Emma Groot, rosy mauve; J. L. Crowther, buff apricot; Rookwood, deep mauve; Pinkie, a garden variety, with medium-sized blooms, excellent for cutting; Rapallo, a garden variety with blooms of a striking colour, crimson-bordered yellow; Border Perfection, a dwarf grower producing large blooms of a dark red colour. A bloom of this gained championship honours at one of the local shows.

The following varieties in the collection last year maintained their good qualities during the past season:—Mrs. C. G. Hood, bright rose, some excellent seedlings of which have been raised from this by the local growers who favour it as a parent; H. D. Cartwright, orange, which followed up its last year's successes at the shows; Sheila Ward, yellow, tipped white; Beau Brummell, royal purple; Evelyn Winter, white; Earl Williams, crimson, tipped white; Shudow's lavender; Porthos, violet purple; Bordeaux, red; Berengaria, gold; Cadiz, orange and chrome yellow, a most profuse bloomer; Ivy de ver Warner, pink; Jersey Beauty, pink; Mabel Lawrence, crimson scarlet; Kitty Dunlap, rosy mauve; Katherine, mulberry; Mrs. Carl Salbach, pink; Amun Ra, copper and gold; Golden Fleece; and Lady Stonehaven, an Australian-raised variety, quite the best yellow either for show or garden.

During the last three weeks we have had a glorious show of chrysanthemums, and a couple of beds of Lilian Bird have been a great sight. This is a pink variety that is grown extensively for the market here, and there is nothing more dainty for vase work.

This has been the driest season on record, but as we have a good water supply there are no restrictions placed on its use. Lately we have had wintry conditions with touches of frost, and salvias, bedding begonias, amaranthus, iresines, and the like have not been able to stand it.

# Orchard Notes for August.

## THE COASTAL DISTRICTS.

The bulk of citrus fruits, with the exception of late ripening varieties, will now have been marketed, and cultural operations, pruning, spraying, &c., should be receiving attention. Where trees show indication of impaired vigour, pruning should be heavy, both in respect of thinning and shortening branches. Where trees are vigorous and healthy a light thinning only will be necessary, except in the case of the Glen Retreat Mandarin which in coastal lands is invariably disposed to produce a profusion of branches with consequent overproduction and weakening of the constitution of the tree in addition to the fruit being small and not of the best quality. Where white louse is present on the main stem (where it almost invariably makes its first appearance) or branches, spraying with lime sulphur solution in the proportion of one part of the concentrate to ten parts of water after the centre of the tree has been opened up by pruning will be found most beneficial.

In dealing with trees which show signs of failing, investigation should be made near the ground level for indications of collar rot and in the North Coast district particularly, for the presence of the weevil root-borer which may attack the roots in the vicinity of the thin bases or at some feet distant. A very light application of paradichlor. buried a few inches under the soil in circles around the tree and the surface tamped firm is considered efficacious in destroying the pest. The distance between the circles (shallow openings connected throughout) should not be more than 18 inches. It may be necessary to repeat the application at three to four weeks' intervals.

Spraying with Bordeaux mixture is desirable as it will, if properly applied, destroy the spores of various fungi later attacking both foliage and fruit.

Where for any reason healthy trees of vigorous constitution are unprofitable they should now be headed back, in fact, the whole of the top removed, leaving only a few selected "arms" of previous branches, all other branches being cut clean away at their base. Three or four main arms, whose length will vary from 2 to 4 ft. according to the size of the tree, will form the future head of the tree and from these numerous shoots will originate; these shoots in turn are reduced according to circumstances, usually from two to five on each arm, and given fair attention they will be in a fit condition to receive selected buds from a prolific tree by next autumn. It is advisable when the shoots intended for budding have attained a length of about 6 inches to nip off their terminals for the purpose of stiffening their growth, otherwise they are liable to be blown off by winds. All branches or parts removed in pruning should be carefully collected and burned. Applications against pests and disease could hardly be satisfactory if the material for re-infestation is available throughout the orchard.

Working the land is essential and disc implements give best results. Before ploughing it is advisable to apply the necessary fertiliser, not just around the trees beneath their branches, but over the whole orchard, the feeding roots mainly extending beyond the extremities of the branches. The depth to which ploughing should be effected will depend on the nature of the soil and its original preparation. Where the subsoil is of a permeable nature, or has been broken up in the first instance, ploughing could be much deeper than on land where due consideration had not been given to this practice. It will also be noted that among some of our light loams that fertility is confined to a shallow depth, where it would be futile to persist in deep ploughing to force the roots into a subsoil from which they could derive but little sustenance. Following upon ploughing, the soil should be further treated until finely broken, the implement necessary will depend upon the constituency of the soil. Generally a good harrow will meet all requirements. On the completion of ploughing between rows an open furrow should not be left on the border or margin, but two or three furrows should be turned back to fill this and the whole then worked sufficiently to leave an even surface throughout the orchard. Except for the purpose of turning in fertiliser or green manure, a good type of disc cultivator can be substituted for the plough and will give at least an equal result.

The planting of trees may be continued and with the exception of custard apples (which should be left until the end of August) should be expedited. The planting of citrus trees this season has been inextensive, but there is a much better outlook for orange production than has been previously offered, and attention should be confined mainly to good varieties of this class—viz., Jaffa and Siletta with a lesser quantity of late Valencia. The preserving of orange juice will very materially assist in the absorption of our crop, and the fact that the trees develop much more rapidly in this State than in Southern producing regions is distinctly in our favour, also our fruit contains a much higher sugar content. This, however, is not to be accepted as an invitation to continue the practice of sending immature fruit to the Southern markets.

Grape vines should be pruned, and where cuttings for planting are required these should be selected, trimmed, and heeled in slightly damp soil. Canes intended for cuttings should not be allowed to lay about and dry out, but treated the day they are severed from the plant. Cuttings are frequently made of excessive length. Ten to twelve inches is a fair length, allowing for insertion in the soil to admit of the top bud with a short section of the internode to protrude. Growth is only desired from the upper or exposed bud.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All pruning other than that applied to peaches and varieties which are late in coming into growth should be completed this month and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. The time is opportune (when there is indication of the buds swelling) to work over (where the stock is reasonably vigorous) unprofitable trees. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

The pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation as they are subject to much variation.

Late spraying against San José scale where present should be applied with an efficient oil emulsion before any growth appears. Each particular brand has its advocates. Where the scale is persistent, a 2 per cent. solution of Volck may be applied subsequent to the appearance of foliage. Both of these sprays are efficacious against peach or other aphis, at a much reduced strength. One per cent. has given satisfactory results. The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted, deep working is most detrimental. The matter of seedling stocks for apples and the inferior plants frequently received from Southern nurseries prompts a query as to how many seeds have been stratified for spring planting, and if any effort is being made towards raising a local supply of nursery stock. In earlier years citrus planters were much dissatisfied with Southern supplies, which led to the establishment of local nurseries and later to bud selection. There is certainly sufficient enterprise and energy in the Stanthorpe district to make a similar attempt. Its application only is required.

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# Farm Notes for August.

Land which has been lying fallow in readiness for early spring sowing should now be receiving its final cultivation prior to seeding operations. Potato-planting will be in full swing this month, and in connection with this crop the prevention of fungoid diseases calls for special attention. Seed potatoes, if possible, should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. If, however, none but large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slacked lime, or wood ashes, as soon as possible after cutting. Where it is necessary to take action to prevent possible infection by fungoid disease, the dipping of potatoes in a solution of 1 pint of 40 per cent. formalin to 15 gallons of water, and immersing for one hour, will be found effective. Bags intended for the subsequent conveyance of tubers to the paddock should also be treated and thoroughly dried. After dipping, spread out the potatoes and thoroughly dry them before re-bagging. Where the tubers are cut, the dipping is, of course, carried out prior to cutting.

Arrowroot, yams, ginger, and sugar-cane may be planted this months in localities where all danger from frosts is over.

Maize may be sown as a catch crop, providing, of course, that sufficient soil moisture is available.

Sweet-potato cuttings may also be planted out towards the end of the month.

Weeds will now begin to assert themselves with the advent of warmer weather; consequently cultivators and harrows should be kept going to keep down weed growths in growing crops and on land lying fallow, as well as on that in course of preparation for such crops as sorghums, millets, or panicums, maize, and summer-growing crops generally.

Tobacco seed may be sown on previously burnt and well prepared seed-beds.

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J. F. F. REID,
Editor of Publications, Department of Agriculture and Stock.

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# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | July, 1929. | | August, 1929. | | MOONRISE. July, 1929. | Aug, 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | a.m. | a.m. |
| 1 | 6.47 | 5.5 | 6.37 | 5.19 | 12.18 | 2.22 |
| 2 | 6.47 | 5.5 | 6.37 | 5.19 | 1.18 | 3.28 |
| 3 | 6.47 | 5.5 | 6.36 | 5.20 | 2.22 | 4.37 |
| 4 | 6.47 | 5.6 | 6.35 | 5.21 | 3.30 | 5.41 |
| 5 | 6.47 | 5.6 | 6.34 | 5.22 | 4.39 | 6.38 |
| 6 | 6.47 | 5.6 | 6.34 | 5.23 | 5.49 | 7.26 |
| 7 | 6.47 | 5.7 | 6.33 | 5.23 | 6.58 | 8.6 |
| 8 | 6.47 | 5.7 | 6.32 | 5.24 | 8.0 | 8.42 |
| 9 | 6.46 | 5.7 | 6.31 | 5.24 | 8.51 | 9.13 |
| 10 | 6.46 | 5.8 | 6.30 | 5.25 | 9.35 | 9.46 |
| 11 | 6.46 | 5.8 | 6.29 | 5.25 | 10.12 | 10.16 |
| 12 | 6 46 | 5.8 | 6.28 | 5.26 | 10.58 | 10.51 |
| 13 | 6.46 | 5.9 | 6.27 | 5.26 | 11.17 | 11.26 |
| | | | | | | p.m. |
| 14 | 6.46 | 5.9 | 6.26 | 5.27 | 11.47 | 12.5 |
| | | | | | p.m. | |
| 15 | 6.46 | 5.9 | 6.25 | 5.27 | 12.18 | 12.49 |
| 16 | 6.46 | 5.10 | 6.24 | 5.28 | 12.51 | 1.39 |
| 17 | 6 45 | 5.10 | 6.24 | 5.28 | 1.27 | 2.31 |
| 18 | 6.45 | 5.11 | 6.23 | 5.29 | 2.7 | 3.14 |
| 19 | 6.44 | 5.11 | 6.22 | 5.29 | 2.54 | 4.19 |
| 20 | 6.44 | 5.12 | 6.21 | 5.29 | 3.44 | 5.20 |
| 21 | 6.43 | 5.12 | 6.20 | 5.30 | 4.37 | 6.15 |
| 22 | 6.43 | 5.13 | 6.19 | 5.30 | 5.31 | 7.11 |
| 23 | 6.42 | 5.13 | 6.18 | 5.31 | 6.27 | 8.8 |
| 24 | 6.42 | 5.14 | 6.17 | 5.31 | 7.25 | 9.5 |
| 25 | 6.41 | 5.14 | 6.16 | 5.31 | 8.18 | 10.3 |
| 26 | 6.41 | 5.15 | 6.15 | 5.32 | 9.15 | 11.4 |
| 27 | 6.40 | 5.15 | 6.14 | 5.32 | 10.11 | ... |
| | | | | | | a.m. |
| 28 | 6.40 | 5.16 | 6.13 | 5.33 | 11.10 | 12.10 |
| 29 | 6.39 | 5.16 | 6.12 | 5.33 | ... | 1.16 |
| | | | | | a.m. | |
| 30 | 6.39 | 5.17 | 6.11 | 5.34 | 12.9 | 2.22 |
| 31 | 6.38 | 5.18 | 6.10 | 5.34 | 1.14 | 3 26 |

## Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|---|---|---|---|
| 7 July | ● New Moon | 6 47 | a.m. |
| 14 „ | ☾ First Quarter | 2 5 | a.m. |
| 22 „ | ○ Full Moon | 5 20 | p.m. |
| 29 „ | ☽ Last Quarter | 10 55 | a.m. |

Perigee, 6th July, at 11.0 p.m.
Apogee, 20th July, at 2·24 a.m.

On the 4th the Earth will be at its greatest distance from the sun, about 94,450,000 miles.

The apparent nearness of Venus and Jupiter, about the middle of the month, will be noticeable in the early mornings, though Jupiter, being on the far side of its orbit and Venus rather on this side, a distance of 500,050,000 miles must intervene between the two planets.

At 1 o'clock in the morning of the 27th the Moon will be passing Uranus, which will require a telescope or binoculars to be seen. This occasion will afford an opportunity to locate Uranus in the constellation Pisces, about twice the length of the Southern Cross to the south-eastward of the Great Square of Pegasus.

Near the middle of the month the zodiacal constellation Sagittarius will be over the eastern horizon at 6 p.m., Capricornus at 8 p.m., and Aquarius at 10 p.m. Markab and Scheat, the stars which mark the western side of the Great Square of Pegasus, will be just coming into view, and an hour later the whole Square will be visible.

The Southern Cross will be upright about 6 p.m. near the beginning of the month, and lying on its side, 30 degrees west of the South Celestial Pole, at midnight. At that time the brilliant star Achernar will be about as far on the eastern side of the Pole as the head of the Cross is on the western, but somewhat higher up.

| | | | |
|---|---|---|---|
| 5 Aug. | ● New Moon | 1 40 | p.m. |
| 12 „ | ☾ First Quarter | 4 0 | p.m. |
| 20 „ | ○ Full Moon | 7 42 | p.m. |
| 28 „ | ☽ Last Quarter | 6 0 | a.m. |

Perigee, 4th August, at 7.12 a.m.
Apogee, 16th August, at 1.0 p.m.

The conjunction of the Moon with Jupiter on the night of the 1st will take place below the horizon; when they rise about 2 a.m. the Moon will be a few degrees eastward of the planet.

The conjunction of Venus with the Moon on the 2nd, about 1 p.m., will be an interesting daylight phenomenon when the Moon in crescent shape is passing to the northward and below Venus, at a distance nearly as great as the length of the Southern Cross. Of course it will be necessary to have the sun shaded from view by a building or some opaque body. The position of Venus and the Moon will be about 45 degrees east of the Sun, but only about 15 degrees from the meridian.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXII. 1 AUGUST, 1929. PART 2.

## Event and Comment.

### Dairying at Mackay.

ROUND about Mackay, particularly out towards the Eungella Range and beyond, there is some excellent dairying country and already the foundation of a sound industry has been laid there; and, with the establishment of a modern butter factory there is every reason why the industry should extend and that cream should be added to sugar as a sound economic combination. That dairy farmers in the Mackay district have started on right lines was evident at the recent show. With the cattle section the Minister for Agriculture and Stock, Mr. Harry F. Walker, who opened the show, was strongly impressed. After congratulating the farmers assembled on the general excellence of the exhibits, especially the cane, he expressed particular interest in the stock parade. Speaking of herd improvement he remarked that some people might not realise its importance, but he assured his hearers, who were mostly canegrowers, that successful dairying depended just as much on science as successful sugar cultivation. Through the greater care and attention now given to the essentials of his industry the Australian dairy farmer was able to produce butter of unexcelled quality. The market for good butter was anything but oversupplied, and farmers of the Mackay district who had suitable land and were otherwise in a position to do so could engage in dairying without any immediate fear of overproduction. Their market was assured and the industry provided a fair living. In the Gympie district last year 1,800 suppliers had averaged over £330 a man for butter; in addition, they had also produced pigs, maize, and other crops. He urged local farmers to interest their boys in the possibilities of dairying in their home district, to get them out on to the Range and help to keep their own butter factory going. He was big enough to give credit to the late Government

and his predecessor in office, Mr. W. Forgan Smith, for many of the improvements brought about in dairying as well as in the sugar industry. They must, however, continue their efforts at herd improvement and create for Queensland further production records. Local production and manufacture would obviously bring more money into the district and that would also appeal to local commercial interests. With the good roads they had already, and other highways under construction and already planned, with motor transport and mechanical milking, there was nothing to prevent anyone with the necessary means and experience from engaging in an industry that was at once interesting and profitable. He appealed to the young men of the Meakay area to remain on the land where they were better off, where they could live an independent life and acquire a competence, instead of worrying about getting a city job in which not only their usefulness, but very often their opportunities were unduly limited. He urged the farmers present to take advantage of the Better Bull Scheme and other facilities at their disposal for the improvement of district herds. Mr. Walker commended the quality of the dairy cattle exhibited which were equal to the stock paraded in Southern show rings, and which would provide a sound foundation for district herds when dairying developed to the extent that the great natural advantages of the back country of Mackay warranted.

## Agriculture from an International Aspect.

HELPING to clear away the fog of misunderstanding that has, in recent years, enveloped many of the more important questions as between nations in the two hemispheres is a group of associations, such as the Royal Institute of International Affairs in Great Britain and the Council of Foreign Relations in the United States, which devote themselves to a sympathetic study of the world's affairs. They are quite unofficial, yet they are already beginning to influence for good the factors that govern affairs in the world to-day. They watch the formation and trends of international policy, and help to create that atmosphere of sound judgment and goodwill so essential in modern international relationships. They encourage the taking of the longer view that comes from sober consideration of any problem that arises and that may threaten the continuance of international amity. Through them the powers that are may be made aware of national tendencies before they reach a point of international tension. They help to break down the barriers that unduly restrict mutual understanding and appreciation of differing points of view.

As well as to the larger affairs of statesmanship these associations also encourage the study of industrial relationships, and the value of this study is evident from an address* by Sir Daniel Hall, K.C.B., on the dependence of agriculture on international factors, which we now have before us. In it he reminds us that we are accustomed to think of agriculture, though having some national significance, as more or less a local or parochial affair; and that many of the features which characterise modern agriculture are by no means purely national, but are world-wide, and may have to be met by international action. And he presses the point that we cannot consider merely our own agriculture when trying to find out the cause or origin of our own difficulties, but must regard the problems of primary production from an international aspect if we are to attain any reasonable solution of those difficulties. From the findings of the World Economic Conference at Geneva last year on the results of a world-wide inquiry into the economic situation, we get a confirmation of the fact that agricultural depression is world-wide—though there is a tendency, even in the address under review, to rather exaggerate some of the causes and extent of that depression. It is accepted, however, that there must be some general underlying cause which is affecting primary industry universally, and that is responsible for the fact that the man who is growing food and clothing—the world's first necessities—is anything but satisfied with what he gets for his outlay and his labour. The Economic Conference attempted to diagnose the cause of this, and arrived at the conclusion that it was the general lowness of price for primary commodities. The term is, of course, comparative, but on this question of low values it was agreed that in every producing country there is a disparity against the farmer.

Low prices, of course, are the natural corollary of over-supply. The question therefore arises: To what extent is the world over-supplied with the necessities of life? The lecturer had this to say about it:—

> It seems rather ridiculous to talk about over-supply of food when at the same time one hears of great populations all over the world who are confessedly short of the prime necessities of life. Therefore, the Economic Conference concluded that the over-supply was of a relative and not of an

*Extract from the "Journal of the Royal Institute of International Affairs," Jan., 1929.

absolute character. In fact, if you come to analyse the figures a little more carefully; if you analyse, for instance, the relation between the world's population in the years immediately preceding the War, say, the years 1909 to 1913, and the amount of agricultural production during that period compared with the population and the agricultural production at the present time, you will find that the population has increased faster than the food supply. There is not a real over-production of food; but there is an over-production of food in relation to the consuming capacity of the peoples. By "consuming capacity" I do not mean their appetites, I do not mean their desire for food, I mean the amount of money that they have in their pockets wherewith to pay for food.

That is the real diagnosis of the situation. Because over Europe in particular there are so many millions of people unemployed, unable to exercise their normal purchasing power, the demand for food has fallen below the supply, and we have over-production with consequent low prices for all the producers of food. The essential need for the food remains, but because the world is disorganised and out of joint, because there are so many people here and in other disturbed regions of the world, like China, who cannot exercise their old purchasing power, the effective demand is below what we took as the average human demand in the years immediately preceding the War.

## The Rural Exodus.

AFTER analysing the position from many angles, and reviewing the factors affecting the prices of primary products in various parts of the world, Sir Daniel Hall concluded his very informative and suggestive address with a reference to the rural exodus that is going on in every agricultural country. If no alternative can be found to the present unsatisfactory marketing methods there is a danger, he averred, that the destructive power of unrestricted competition among the farmers of the world will tend to destroy the agriculture of the world. There is in every country at the present time a tendency to leave the land. The young ones go whenever they get a chance and wherever they see an opening. Even in an agricultural country like France there is an extraordinary city-ward movement of the French peasant notwithstanding his own traditional attachment to his own bit of soil. All over the world the same phenomenon may be observed. The annual returns of abandoned farms in the United States show that the farmer, under the present prevailing conditions, is not prepared to stick it out. This is the slow change by which agriculture responds to low prices. You cannot adjust production quickly; but it does slowly adjust itself by the retreat of men from the land. "We cannot afford," continued the lecturer, "to go on letting these men go. I began by saying that the actual production of food in the world is, in relation to population, less than it was in 1914. We are actually in a short position, though the shortage cannot declare itself because of the difficulty that so large a proportion of the population experience in making their demand for food effective. Therefore, it is necessary for States like our own to consider what steps they can take to arrest this flow, lest we suddenly slip over the danger point and find ourselves in a real scarcity because there are no longer the people on the land to produce food for us."

## The Welfare of Agriculture—An International Question.

THE world position of agriculture and its present day trends constitute something more than a national question; they have become of international concern. There are already in existence international organisations which gives some consideration to the conditions of primary production from a world-wide standpoint. One of these is the International Institute of Agriculture in Rome, whose business it is to collect and disseminate information as to statistics, markets, economic relationships, land tenure, and other factors. But the only international agency that views this world problem from the standpoint of the farmer is a body that grew out of an International Congress of Agriculture in France, and which calls itself the International Commission of Agriculture. Its aim is to unite tentatively, slowly, but in the end effectively, farmers' organisations throughout the world. It has already a considerable and representative membership of various rural bodies of most of the continental countries of Europe, and judged on its present standing and efforts it has all the components of a good and sound international organisation representing not the official or scientific points of view, but the actual economic demands of the farmers themselves. The attention that is being given to the problems of primary production that are common to most countries is a healthy sign, and any movement calculated to strengthen the farmers' economic position will, it may be safely assumed, meet with the sympathetic support of the industry in Australia.

# Bureau of Sugar Experiment Stations.

## INTERNATIONAL CONGRESS OF SUGAR-CANE TECHNOLOGISTS.

*Subjoined is a report by the Director of Sugar Experiment Stations, Mr. H. T. Easterby, on the Third Congress of the International Society of Sugar-cane Technologists held at Sourabaya, Java, June, 1929, and on some phases of the sugar industry in Java, which will be read with interest by Queensland producers.*

### PART I.

### THE SUGAR CONGRESS.

THE Third Congress of the International Society of Sugar-cane Technologists, by far the most important yet held, was opened at Sourabaya on Friday, 7th June, by an inaugural speech from Dr. H. Jelgerhuis Swildens, President of the General Syndicate of Sugar Manufacturers in the Dutch East Indies, and responded to by the President of the Congress, Dr. Jesweit.

Representatives from the following cane countries were in attendance, viz.:—Australia, Hawaii, Indo-China, Japan and Formosa, Java, Mauritius, Philippines, Trinidad, United States of America, British India, and Egypt.

Outside of Java, Hawaii had the strongest representation, thirteen members attending—five from the Experiment Station and eight from plantations.

The hospitality extended to the foreign members was beyond praise, and everything possible was done to make the stay of members in Java enjoyable and instructive.

Valuable Bulletins were read in Congress, which have been brought back for the use of the Sugar Experiment Station, but in my opinion the greatest value of these meetings lies in the personal exchange of views between the representatives of different countries and the cordial relationship thus engendered.

Papers were read at the general meetings on the development of the Java sugar industry, the development of selection and breeding of the sugar-cane in Java, irrigation, its organisation and importance for the Java sugar industry, and the economic advantages and drawbacks of the sugar-cane industry in Java.

In the Agricultural Section which I attended, papers were read or summarised on cane cultivation in Java, India, Mauritius, Fiji, Louisiana, and Queensland, and discussions took place on these as well as on soil surveys, chemistry of sugar-cane, and other cognate subjects. Other sections comprised factory operation and chemical control (upon which Mr. Bennett will supply data) and the diseases of cane, and insects pests.

On Wednesday, 12th June, a number of papers on varieties of cane were dealt with, and considerable discussion ensued which should be of much benefit to the industry.

On behalf of the Government of Queensland, the Minister's letter, containing a cordial invitation to hold the next meeting of the society in our State, was presented and supported by addresses by myself and Dr. Gibson, who represented the Australian Sugar Producers' Association; and who spoke also on this particular matter, on behalf of the Queensland Cane Growers' Council. After considerable discussion it was stated that the aim of the Congress was to hold the conferences alternately in the two hemispheres, and it was decided that Porto Rico should have the honour of the place of meeting in 1932, while in all probability Queensland would be selected in 1935.

At the final meeting, Dr. F. W. Zerban was appointed President of the next Congress, and various committees were then appointed. At my request Mr. A. F. Bell was placed on the Quarantine and Disease Committees, Dr. Kerr on the Agricultural and Soils Committees, and Mr. Bennett on the Factory Operations Committee.

The following resolutions were then carried:—

*Resolutions.*

"Whereas the discovery by Dr. E. W. Brandes of the transmission of sugar-cane Mosaic by *Aphis Maidis* has proved of immeasurable value to all sugar-cane countries for making possible the development of effective control measures and the systematic breeding of resistant varieties, the section of cane diseases of the Third Conference of the International Society of Sugar-cane Technologists proposes that this Conference send to Dr. Brandes its sincere thanks and appreciation for this fundamental discovery."

"Whereas, exact knowledge on the influence of irrigation and drainage is still very incomplete, it is voted that a resolution be adopted that in all canegrowing countries more attention should be paid to these problems and that more scientific experiments should be carried out on this subject."

"Whereas, soil surveys and the classification of soils are fundamental for the proper study of soil fertility and manuring for the improvement and maintenance of sugar-cane soils, it is resolved that the Standing Committee shall—

(*a*) Secure as far as practicable uniformity in the classification and in the nomenclature of soils;

(*b*) Collect data on soils and fertility experiments on sugar-cane soils of the various countries concerned."

"Whereas at the present time many identical varieties occur under different names and also different varieties are cultivated under the same name, and whereas rational studies on sugar-cane need a reliable identification and description, and whereas cane breeding work needs the availability of all original canes and of those canes, which played a part in cane husbandry, and whereas further investigations on genetics and taxonomy of sugar-cane are of prominent importance, for further development of the sugar-cane industry, it is resolved that the assembled delegates of the Java meeting of International Society of Sugar-cane Technologists recommend that in two or possibly three different countries collections should be made of all cane varieties mentioned above; and be it further resolved that the executive committee take the necessary steps for the establishment of such collection gardens."

"Whereas, it has been demonstrated that there is considerable risk in the unwary introduction of new canes into any country, and whereas it is desirable to keep track of the proper nomenclature of all importations and prevent further confusion in names, it is resolved that the assembled delegates of the Java meeting of the International Society of Sugar-cane Technologists recommend that new importations be allowed only in small quantities and to recognised institutions, and that steps be taken to record at the time of importation at some central place in the country, preferably under a botanist, full details about the variety such as the name, country of origin, a short description and specimens of canes, buds and leaves, and whenever possible it is further desirable to keep the cane growing at the central place at least for a time to render its subsequent identification easy and certain; and be it further resolved that copies of this resolution be sent to all Government and other institutions interested in the sugar-cane industry and to the standing committee."

"Whereas, the current technical literature on sugar-cane and beet is published in a large number of periodicals and often is written in a language which is only understood by a minority of the technologists or is not available in the local libraries, whereas further reinforcement of the interest of organisations and of the personal members of our association is desired for further development of the activities of the association, be it resolved that a new periodical be started or an existing periodical be requested to publish adequate abstracts in the English language, submitted by the authors themselves, of all technical papers of more general importance; and be it further resolved that a committee be appointed by the chairman to devise ways and means for carrying this resolution into effect."

"Whereas, at the present time different countries report their field and factory results in many different and unrelated units, thus making mutual comparisons extremely difficult and time-consuming, and whereas, the metric system is based entirely on the decimal system of numbers, and relates logically measures of volume to measures of mass, has been legally adopted by most countries, and is in universal use throughout the scientific world, be it therefore resolved that the cane sugar industries of the countries represented in this society be urged gradually to introduce the metric system, and that until that is accomplished, they publish all field and factory results in metric units, either exclusively or along with the customary units."

"Whereas the International Committee for Uniform Methods of Sugar Analysis has not held a meeting since 1912 and has practically disbanded, and whereas there exists at the present time a great deal of confusion owing to the use of different analytical standards in different countries, be it therefore resolved that a committee consisting of Messrs. F. J. Bates, C. A. Browne, Noel Deerr, P. Honig, and W. R. McAllep be appointed, which committee shall approach prominent sugar chemists

in all important countries producing sugar from the beet or cane, for the purpose of reviving the International Commission for Uniform Methods of Sugar Analysis.''

In the course of the meetings and at their conclusion, a number of excursions were arranged for members to

(*a*) View institutions of general interest;

(*b*) Excursions for factory experts; and

(*c*) Excursions for agriculturists and soil experts.

These were of a highly interesting character, especially the one to the Pasoeroean Experiment Station, which will be commented on later.

The Government of Java and private railways granted a free pass over their lines to each member.

The final function was an official dinner at Bandoeng, at which the hospitality, kindness, and courtesy shown to members of the Congress by Java was suitably acknowledged by the representatives of the other countries.

In concluding this part of the report it may be said that it will be exceedingly difficult for any country in which the Congress may, in future, be held, to reach the high standard set by Java. The cost of the Congress to the General Syndicate of Sugar Manufacturers must have been very great, including as it did all the printing of papers, &c., and the various excursions and entertainments which were given. Strong committees were formed, including Honorary, Executive, Preparations, and Accommodation. Such committees will be necessary in the case of a visit to Queensland at a later date, and all sections of the industry will need to be strongly represented and to work hard in order to make the Congress as successful as it was in Java in 1929.

## PART II.

## SOME PHASES OF THE SUGAR INDUSTRY IN JAVA.

### (*a*) GENERAL.

It may be said that the sugar industry in the Dutch East Indies is confined to Java. Sugar-growing on a small scale has been carried out in Sumatra and the Celebes, but the relative scarcity of labour precludes its present success.

The output of sugar in Java has been steadily increasing, as the following figures will show:—

| | Tons. |
|---|---|
| 1922 .. .. .. .. .. .. | 1,808,000 |
| 1923 .. .. .. .. .. .. | 1,793,000 |
| 1924 .. .. .. .. .. .. | 1,997,000 |
| 1925 .. .. .. .. .. .. | 2,300,000 |
| 1926 .. .. .. .. .. .. | 1,973,000 |
| 1927 .. .. .. .. .. .. | 2,309,000 |
| 1928 .. .. .. .. .. .. | 2,950,000 |

Java now ranks second to Cuba in cane-sugar production. Its average production per acre is 6 tons of sugar.

The total cultivated area of Java is given as 16,700,000 acres, of which 480,000 acres are under cane—or not 3 per cent. It can be seen, therefore, that the yield of sugar per acre is very high. All the sugar-cane is grown on the eastern side of Java.

#### The Land System in Java.

Practically all the land used for canegrowing is rented from the natives of Java. The Government protect the natives against themselves as they would be willing to sell their lands for any slight sum, and as one Java man put it, ''Buy a fountain pen with the proceeds, with which he could not write.'' The rent is fixed by the Government on the basis of the probable maximum rice production of the land in question.

For the same reason land cannot be rented by Europeans for longer than three and a-half years unless a minimum rent is paid, fixed by the Government. In 1926, over £2,000,000 was paid for supplies of materials and rent of land, while the wages paid to native labour in the same year is given as being £8,000,000. The amount of taxation, direct and indirect, paid by the sugar industry and its employees, amounted to £2,000,000 in 1926.

**The Present Position of the Industry.**

There are stated to be 179 plantations in Java, the area of cane supplying these mills varying from 1,750 to 5,000 acres; the bulk of the mills, however, were supplied from areas of cane of 1,750 to 2,800 acres. It will be seen from this that the mills in Java depend for the greater part on smaller acreages than in Queensland, the much higher yield of cane and sugar per acre accounting for this. Practically all the plantations grind their own crops. Of the 179 mills, over 100 are owned or managed by seven companies. Outsiders seldom start sugar mills, only the established concerns with long experience of Java conditions, and possessing adequate capital, making new ventures. The larger mills have latterly been increasing both by extension and amalgamation. It is necessary to obtain permission from the Government in order to build a new mill or to extend the area of an existing plantation, and this permission may be withheld if there is a probability that a new mill would endanger the welfare of the native population in the district.

The value of exports from Java in 1926 was £63,000,000; of this the sugar industry accounted for £23,000,000.

Transport conditions are in many cases crude, the buffalo-drawn two-wheeled wagon being still largely used, but this is gradually being superseded by locomotive and motor traction.

Only plant crops are grown, as after one crop of sugar-cane the land has to be returned to the native owner for the cultivation of native crops, such as rice and maize. Sugar-cane is only allowed once in three years, so that a legally enforced rotation becomes imperative. It is for this reason, combined with the intensive cultivation of small areas by hand labour, that the yield per acre is so high. It also means that the area of an estate is at least three times larger than its annual plantation.

There are about 900,000 unskilled labourers, mostly in the fields; children and women earn from 4d. to 6d. per day, and men from 10d. to 1s.—all on piecework. When a native considers he has earned sufficient for his wants he will very often sit down for the rest of the day. This class of labour is mainly employed between April and October; they have other means of support during the months of November to March. In addition to this large mass of unskilled labour, the sugar industry in Java employs some 56,000 regular native employees, most of whom are more or less skilled, and are paid according to their position from 1s. to 7s. per day—the average running from 1s. to 2s. 6d. per day.

The General Syndicate of Sugar Manufacturers practically comprises all the companies owning or managing sugar mills in Java, and its principal work is controlling the agricultural, fiscal, irrigation, and educational problems—e.g., the experiment station. The United Sugar Producers' Association of Java controls the sales of sugar. It is somewhat remarkable that the island of Java with its immense population of 40,000,000 consumes less sugar than does Australia. The principal buyers of Java sugar are British India, Japan, and China. Two-thirds of the manufactured sugar is plantation whites. No refined sugar, as far as I know, is made in Java.

(*b*) CANE CULTURE.

The price paid to the natives for leases, and the forbidding of growing ratoon canes, compels the plantations to get the highest possible yield of cane and sugar per acre, and for this reason the cultivation has necessarily to be of the most intensive character. The intensive cultivation is made easy for the sugar planter in Java, because of the abundant and cheap supply of labour; hence the tillage operation is carried out almost entirely by hand, and planters say that hand cultivation is cheaper for them than mechanical cultivation.

**Methods of Cultivation.**

The cultivation of the cane is mostly carried out on what is known as the "Reynoso System." After the rubbish from the previous crop of rice, &c., has been removed, the drills to receive the cane are dug in the land by hand, and the earth or clods are piled up symmetrically at the sides so as to form a comparatively deep channel, the interspaces being left entirely untilled. It is thus possible to plant the cane much deeper than is done by any ploughing system, and the cane can later on be hilled up higher, obviating the risk of lodging by affording more support to the roots of the cane.

Ploughing the soil is not much used in Java, though it is applied in some districts to lighter soils, where it does not give much less output in sugar.

As the greater part of the land on which cane is grown has had a previous crop of rice under water for months it is imperative that the land be drained, and, accordingly, drains are dug in the shape of trenches, including a ring drawn round the field, so that at the lowest point any superfluous water is removed as quickly as possible. It is usual to try and lay out the drills for cane in a north to south direction, so that the plants will obtain as much sunlight as possible. After the drainage trenches are dug, the digging of the planting drills commences. The soil is usually saturated with water from the previous crop, but the natives are used to working the soil in this manner. It may be pointed out here that, while there are large numbers of canefields, none of them are very big in area. Considerable attention is given to the proper piling up of the clods removed from the planting drills. The depth of the drills varies from 12 inches to 18 inches, and may be from 16 inches to about 2 feet in width. The distance from centre to centre of the drills is usually about 3 feet to 4 feet 6 inches in width. Sometimes the depth of the cane drills is made by digging twice, or by digging once and then by forking out or chipping out the bottoms. The field is then left fallow for some time, being exposed to air and sunlight. Frequently before planting, some of the oxidised earth is taken from the sides and placed at the bottom of the drills. Some planters, however, put the plants on the untilled bottom of the drills. As a rule, some earth is placed in the drills so as to get a desirable planting depth.

### The System of Planting.

When planting in the bottom of the drills the soil is first made wet by watering it; when the water has drained away the cane cuttings are pressed into the ground to the desired depth. This is usually done by women or children. Other methods are laying the sets in the bottom and covering by earth, while single budded cane is sometimes planted in holes in the drills made with a stick. These plants consist of part of the stalks of cane in the fields that have sprouted buds. The tops are cut off to provide seed cane and the lower parts left on the field till the buds have sprouted; these are then also cut for planting material. In order to get the plants spaced properly ropes with knots at measured intervals are sometimes used and stretched along the drills, the women placing the plants where the knots coincide. When cuttings are used lying horizontally, care is always taken that the eyes lie on each side and are not put underneath the plant, which gives rise to poor germination. Sometimes the cuttings are placed obliquely in the ground. Planting material is taken from the top seed of the standing cane, cuttings of the under portion which has sprouted, cuttings from hill nurseries, and cuttings from specially laid out nurseries on the plains. Formerly much cane planting material was brought from the hills owing to its superior resistance to the Sereh disease, but the almost universal planting of the variety P.O.J. 2878 has made this superfluous. What is known in Java as "rajoengans" or sprouted cane is much used, and pieces with two buds sprouted are usually recommended for planting.

Usually the cane is covered in three times, the earth which lies on the sides being used for this purpose. Often the earth which lies on the sides of the cane drills is turned over before applying the second covering in, so as to better aerate it, thus exposing the hard clods to the effect of the air and sun. This turning over generally puts some loose soil into the drills. Finally, all the soil at the sides of the drills is removed and laid against and between the cane stalks. A large quantity of water is desired then in the heavier soils, as otherwise the clods cannot be made fine enough, and the soil will not fit sufficiently close to the cane stalks. As the final hilling up is usually done at the beginning of the wet season when the cane is from four to six months old, little or no irrigation water is then available, and it is usually left till the first rains of the west monsoon. Before beginning with the final hilling up—which, of course, too, is done by hand—the lower leaves, mostly trash, are removed, so that the earth may fit closely to the stalks, and the earth is stamped against and between them.

### Irrigation Practice.

During five months before the rainy season the cane is periodically watered by women throwing water into the drills by means of pails or cans fixed on handles with which they dip the water out of the irrigation channels.

Irrigation plays a large part in the cultivation of cane, and the different irrigation works in Java are on a scale of considerable magnitude. Only a very small percentage of the cane is cultivated upon unirrigated soils. In fact, this is said to be only possible in recent volcanic soils having a high capillarity.

**Fertilising.**

The manure principally used in Java is sulphate of ammonia, and this is applied to practically every acre under cultivation. Superphosphate is only used on about 79,512 acres of the total area (about 480,000), while potash is hardly used at all, as it is stated that, with one exception, it nowhere had any beneficial effect on the sugar yield, not even on soils poor in potash. Molasses and stable manure have been used to some extent. Green manuring is not practised, as it has only been found to have a beneficial effect occasionally. The results have always been found to be irregular, but it has been admitted that the green manures used have not always been wisely chosen.

Sulphate of ammonia is generally given in two to three doses, generally at the same time as the hilling up is being done, and takes place from three to four and from six to eight weeks after planting. This is done by native women who make a small hole near each stool of cane and pour an accurate measure in from a carefully adjusted spoon. The manure is thus concentrated and does not contribute to the growth of weeds. The whole dose is given within two months after planting. The amount of sulphate of ammonia used averages about 4 cwt. per acre. The weeding is all done by hand.

(*c*) THE EXPERIMENT STATION.

The Sugar Experiment Station at Pasoerocan is acknowledged to be the finest in the world. It is the property of the General Syndicate of Sugar Manufacturers, and possesses its own governing board, and its own revenue. The annual contribution of the sugar factories is at the present time equal to about 4s. 8d. per acre, the revenue amounting to more than £116,000 per annum.

The work of the Experiment Station in Java is carried out by three departments—the Agricultural, the Technological, and the Engineering—each having its own director. The aims of the institution have been summarised as follows:—

> "The search for the best condition in each step of planting and manufacturing beginning with the tillage of the soil and ending with the shipment of the manufactured sugar."

The permanent staff of this Experiment Station at the present time consists of about 45 Europeans, 10 Chinese, and 250 natives, in addition to which there are fifteen European local agents in the Extension Service of the Agricultural Branch. There are thirty-four houses for the European staff, and eight of the fifteen houses occupied by the Extension staff are also the property of the station.

The library contains 20,000 volumes, and is one of the largest in the Tropics. It also does its own bookbinding, &c. There is also a fine museum. Medical attention to the staff is provided free.

**The Agricultural Branch.**

The main objects of the Agricultural Branch of the Station are the study of cane from the botanical, taxonomic, and physiological point of view, internal and external morphology, entomology, cytology, and genetics, breeding of new varieties of cane, studies of the soil, drafting of agro-geological maps of the estates, investigations into weeds on the sugar-cane soils, elaboration of field experiment results, most advantageous manures, times of planting, suitable spacing, studies of diseases and pests, and gathering of statistical data. The local agents doing extension work give advice to factories, collect material for the agro-geological mapping of the sugar estates, control field experiments and make reports furnishing miscellaneous information.

**Field Experiment Service.**

The object of the field experiment service is to study by the aid of field experiments all questions connected with sugar-cane cultivation. Last year, 153 factories took part in the field experiments, and about 2,400 of these trials were harvested. The experiments are carried out by the factories on the advice of the Agricultural Branch of the Experiment Station, and remain under its supervision until they are harvested. It was by the work of the field experiments, in which the yields of newer varieties were compared with the older ones, that the superiority of P.O.J. 2878 was demonstrated in so short a time. In four years— viz., from 1926 to 1929, this variety spread from ½ per cent. to 93 per cent. of the total sugar-cane area of Java.

In order to obtain reliable results the experiments are repeated at least ten times in the same field, the small plots being arranged in chess-board fashion, and

are harvested and milled separately. The averages are based on the theory of probability, and render an immense amount of calculations necessary. This work is done in a special office with the help of modern calculating machines, some of which are electrically driven.

Laboratories are provided for soil investigations, entomological, pathological and physiological researches.

The cane breeding and selection section occupies four rooms, and in order to have sufficient material for crossing purposes, the Station has brought together a large collection of cane varieties, which amount to 650. The collection is planted out in the fields of the Experiment Station, while duplicates exist at Malang where a different climate is experienced.

The cane breeding work will be referred to again later on.

**The Technological Department.**

The Technological Department of the Experiment Station comprises a sugar laboratory, where differences between buyers and sellers are adjusted, an analytical laboratory where special analyses of materials used in the sugar industry are made, also samples of boiler scales, waters of condensation, &c., are analysed. Research work covers the study and improvement of usual and new methods of analyses. There is also a chemico-technical laboratory where investigations are made into the various mill problems, a research room, physico-chemical laboratory, organic and chemical laboratories and rooms where the factories' control are governed. The factories taking part in this control numbering 164, out of a total of 179, send in their data fortnightly, and these are worked out and compiled in such a way that all data is comparable.

The Engineering Department studies the design and operation of the machinery and apparatus of the sugar factories.

Altogether, there are 92 rooms in the Experiment Station, including stores and workshops where instruments are repaired, and, in many instances made. Thermometers, hydrometers, pyrometers, manometers, water meters, and electrical apparatus are repaired and verified on behalf of the factories contributing to the Station.

From this brief résumé it will be seen that the Experiment Station plays a highly important part in the sugar industry of Java, and it is undoubtedly due to this institution that the industry is in the efficient state it is. No one who visits that Station can avoid paying a high tribute to the splendid work of its scientific staff.

As the factory owners in Java are the planters of the cane there is no conflict of interests. Hence it is not alone in the factory side that the Station has contributed to the raising of efficiency, but on the agricultural side it has played a great part in the creation of new seedling canes and in its field experiment work.

(*d*) SEEDLING RAISING.

It may be said that the work of raising seedlings in Java is at the present time on a higher plane than in any other country in the world. This is largely due to the adoption of new methods and the high scientific training of those in charge of the work. Hitherto, it has been the practice to raise seedlings from what are termed "noble" canes only. Owing to the prevalence of the Sereh disease in Java it became imperative to pay more attention to the breeding of canes resistant to this disease. This was attempted by the crossing of the so-called noble canes with resistant "wild" canes, and it has been in pursuance of this line of propagation that the now famous P.O.J. 2878 has been produced. The "Kassoer" cane which is resistant both to Mosaic and Sereh was found growing wild in Java, and Dr. Jesweit considered it to be a cross of the noble cane "Black Cheribon" and a wild cane "Glagah" (*Saccharum spontaneum*) which contains no sugar. Further support for this view has been furnished by Dr. Van Bremer in his cytological investigations, but final proof was obtained by artificial crosses between the noble cane and *Saccharum spontaneum*. For this reason crosses with Kassoer hybrids have strongly come to the front in recent years. The best of them are stated to have inherited from their "noble" parents the high sugar yields and from Kassoer the resistance to the principal diseases affecting sugar-cane in Java. Special investigations are now being made by the cytologist in the examination of the chromosome numbers within the nuclei of the generative cells of the pollen-mother cells, and it is considered that this will have an important bearing on the work, as it appears there is a correlation between the number of chromosomes and the

size of the cells, and by these observations it may be possible to breed canes still more robust.

In the later series of canes bred after 2878 the wild blood has become more diluted and they have proved to some extent not quite so resistant to Sereh disease, so that it is hoped by crossing canes with higher chromosome numbers to obtain more valuable sugar-cane plants.

### (*e*) FIELD EXPERIMENTS.

The Experiment Station state that they have now at their disposal the results of so great a number of field experiments as no other culture on earth can boast of. Up to last year no less than 21,676 complete field experiments had been conducted. These embrace variety, cultivation, and fertilising trials, and all advices issued by the Station are based on the results obtained. Particulars of the lay-out, treatment, and calculation of results from these experiments have been secured, and it may be said that the Queensland Bureau of Sugar Experiment Stations is now engaged in laying out trials of a similar nature in various parts of the sugar areas.

### Conclusion.

It has been many times asked and will be asked again, what lessons can Queensland learn from Java? To this it may be replied that as far as the culture of the sugar-cane is concerned the conditions in the two countries are so radically different that it would be impossible to apply Java methods of cane culture to Queensland. As a matter of fact, cane culture in Java is not "agriculture," but has been aptly described as "horticulture."

Imagine our farmers digging all the cane drills in a field and neatly piling the clods at the sides. Imagine their wives and children planting the cane and irrigating by pouring pails of water over the plants by hand from the neighbouring irrigating ditches, and making holes and pouring carefully measured spoons of fertiliser against each stool. Imagine the different hillings up, and the care taken in the final hilling up when the trash is pulled off the cane and the earth fitted closely up to and between the stools, all by hand labour. Imagine all these operations which actually take place in Java, and then ask—Would it be possible to carry them out in Queensland? Cane so grown in Java is on an immense number of small areas and the crop being all the same variety is marvellously uniform in appearance at maturity.

But we can learn much from Java on the scientific and experimental side. We can learn a great deal about seedlings and field experiments and we can try to copy their amazing scientific thoroughness as far as circumstances will permit. The Dutch people recognise the value of science applied to the sugar industry and are willing to pay for it.

I have to thank the various officers of the Pasoeroean Sugar Experiment Station for many courtesies, and also for very much of the information I have been able to give in this report. I found a whole-hearted desire on the part of the syndicate and its officials to give as much information as they could on the various questions submitted to them.

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## JAVAN SUGAR MILLS.

*Following is the Report of the Sugar Technologist, Mr. Norman Bennett, on the Sugar Mills of Java.*

I HAVE to submit the following report on Javan Sugar Factories as seen during a tour of some five or six factories during the trip arranged by the Java Sugar Syndicate during the third Conference of Sugar-cane Technologists, June, 1929.

The time available for the inspection of the individual factories was short, and the number visited not large. However, I was enabled, through the courtesy of Mr. Ch. Nielsen, of the Handelsvereeniging Amsterdam, to make a visit to one of that company's new factories Goenongsari. The design of this factory and two others of recent construction embodies many new features in machinery installation.

Much of the data available on Java sugar factories has already been commented upon in a detailed report to the Department of Agriculture, at the end of 1924, after a three months' trip among the Javan mills. A further short report was made last year at the completion of the scholarship period. The information contained in these reports is to be taken in conjunction with this report which will

merely cover the essential reports briefly and include newer ideas developed during the past few years.

In this respect, the policy of the Javan industry in relationship to the research work of the Experiment Station must be particularly noted. The technical department is divided into two sections—viz., Chemical section and Engineering section.

## Research Work.

The research work of the Chemical section is done at excellently equipped laboratories at the Experiment Station at Pasoeroean. The application of the results obtained is then applied to factory work proper. At the same time, the section has attached to its staff several practical men whose advice on matters pertaining to chemical control or factory procedure is available at any time.

The research work of the Engineering section is done both in miniature at Pasoeroean and in actual practice at the mills.

At the present time the Chemical section is investigating the following problems:—

1. The structural alterations to the cane fibre as affected by various methods of preparatory devices and the subsequent effect of maceration with both cold and hot water.

   The most interesting point brought out to date is that ordinary methods of preparation for milling leave many of the juice cells of the cane unbroken. This must naturally affect the time factor and the efficient use of maceration water. The thermal death point of the cells has been determined at 130 Fahr.

   This research has a very definite bearing on our Queensland system of preparatory treatment followed by hot water maceration.

2. An investigation of Javan sugars with a view to improving colour quality, refining value, &c., and the relationship of the various clarification systems—e.g., defecation, sulphitation, and liming on the final product. Ultimately this investigation will have a direct bearing on the various boiling systems in use.

   Apart from such work which is of highly scientific nature, the section is conducting a system of uniform control of the re-agents used in the determination of Hydrogen ion.

   In addition, a system of mutual control of the boiling house operations has been prepared by the Station staff, and the Javan mills forward their working figures to the station every fifteen days. These figures are compiled on uniform principles and a typed comparative sheet of the work of all mills is then distributed to the associated mills.

   This system of mutual control is also applied to the figures of milling work and to fuel control.

## Engineering Problems.

The Engineering Department has the following problems in hand:—

1. The application of pressure evaporation to cane juices.
2. The use of air-pre-heating for boiler efficiency and fuel economy.
3. Extensive factory trials of variously designed bagasse furnaces.
4. The extended use of hot water maceration as influenced by the research work of the Chemical section.

In respect to reasearch work as previously set out, attention must be drawn to the policy of the Dutch scientists of submitting every new idea to rigid trials, both on a laboratory scale and on factory tests, before recommending the method or plant to the industry.

Two examples of this system of investigation are:—The rapid elimination of other varieties of cane, in favour of P.O.J. 2878; and the installation of feeding rolls to all mills to assist the feeding of bagasse into the mill.

This latter device is one well worthy of trial in Queensland where the present feeding device is a clumsy pusher.

**The Javan Factories.**

There are about 180 factories operating in Java at the present time. Most of these have been in operation for fifty years or more. Since 1926, three new factories have been erected by the H.V.A. However, there does not appear to be much likelihood of many more new estates being opened up owing to the conditions laid down by the Government, when application for a charter is made.

The factories in Java are run as an integral part of the whole estate, all cane crushed being supplied direct from the fields cultivated by the company, consequently there is no need for any cane-payment scheme. At the same time it must be remembered that the mill is run in order to obtain the maximum yield from the field. At times this means that the factory may be run at a much greater crushing rate than that which would give the best mill figures.

Since the introduction of P.O.J. 2878 with its higher tonnage yields per acre, the mills have greatly increased their crushing rates. One mill which was visited in 1924 was crushing at the rate of 25,000 piculs per day, and now has increased its crushing rate to 37,000 piculs with no further additions to the original plant installed in 1923.

In general, the standard size of the mills is 30 in. by 60 in. with a 30 in. by 60 in. crusher and a 12 roller plant. Preparatory knives are not used except in two factories, and the Krajewski type of crusher finds most favour. There are some mills which have neither crusher nor knives and these installations are usually equipped with a crusher top roll. The average tonnage of cane crushed is between 1,000 and 1,500 long tons per day, and the milling plant is in operation for three to four months of the year, between May and November.

The milling work, judged on sucrose extraction figures, is not as good as in Hawaii; the final bagasse is very coarse and the quantity of imbibition water is usually under 20 per cent. on the weight of cane.

The control of the milling and factory work is based on the weights of the various products of the manufacturing process. These weights are obtained either by direct weighing or by calculation from volume measurements. The Maxwell-Boulogne type of automatic juice and imbibition weigher is considered to be the best, and installations of this type of machine are gradually increasing.

The mills are usually driven independently by steam engines of the Corliss type, with an increasing tendency to some form of automatic speed regulation controlled from the governor by oil pressure on the top journal of the mill.

There are only three electrically driven mills in operation—one installed in 1923 is driven by A.C. motors; the other two, erected in 1927 and 1928, are driven by D.C. motors of 250 horse-power.

The clarification processes used in the mills vary with the type of sugar produced. Three distinct processes are in use:—

1. Defecation—lime only. This type of clarification produces a raw sugar of two grades according to colour variations—viz., Head Sugar of 16-18 Dutch Colour Standard having an average polarisation of 98.4; and Muscovado Sugar 14-16 Dutch Colour Standard, with an average polarisation of 97.5.

2. Sulphitation—usually the hot process in which the juice is heated to 75 C. before sulphitation. Sulphitation in the cold is practised by only two or three mills. This process produces the two grades of raws as above if required, but if the massecuite is submitted to double purging with steam drying in the second purge a plantation white sugar is produced of 25 Dutch Colour Standard and higher. The size of the grain of this sugar corresponds to that of Australian refined, but is coarser and more liable to variation than American Standard Granulated.

   Note.—Both the above processes use settling for removal of the impurities; the settling being universally of the intermittent type as distinct from the Queensland system of continuous settling.

3. Carbonation for the manufacture of white sugar only and a very low-grade molasses sugar. The juices are limed very heavily, then carbonated and passed through filter presses. The carbonation is usually double, but a few mills use a single carbonation process—Proecde de Haan. Sweetland presses have been used at the two new H.V.A. mills for the filtration of the carbonated juice. Further trial of this type of filter is being made.

### Evaporators.

These are usually of standard quadruple type with the heating surface of the first body double that of the other vessels. The extra heating surface gives a supply of steam which is used for the heaters or for one or two of the pans. Later types of evaporators tend towards a quintuple with the bodies of the semi-Kestner type—i.e., tubes of 3½ meters in length. The new factory Goenongsari is equipped with a Kestner pre-heater and a quintuple of 5 semi-Kestner bodies and steam is bled from the first and from the second body of the quintuple. The set is fitted with automatic juice regulation.

### Boiling Station.

The pans are usually of the coil type; these find favour instead of the quicker boiling calandria pans. Usually all pans and the effects are connected to a central condenser of barometric type with connection to a horizontal dry-air pump.

The pan station is well equipped with crystallisers and with centrifugals. The system of double purging for white sugar makes an increase in the number of centrifugals required. After purging, the sugar is passed through a drier, and after drying is often elevated and allowed to drop against a draft of cool air. Some factories pass the hot air from the drier into a closed room to recover the fine particles of sugar carried over by the current of air.

### Boiler Station.

The boilers are usually of fire-tube type, but water-tube boilers generating steam at 12 and in the newer factories at 17 atmospheres are being installed. The boilers at the latter steam pressure are equipped with the Ruth Steam Accumulator.

Firing of the boilers is done by hand due to cheapness of labour, and the furnace construction is of the sloping grate type. The design of the furnaces has recently been altered to give a longer fire bar, and the step grate is closed to within 9 inches of the bottom to force the air through the grate.

All furnaces are used for one type of fuel only; no attempt is made to burn wood or cane trash in the same furnace as bagasse.

Many of the mills have a large surplus of bagasse, and this is baled during the crushing season and stored for subsequent use in the following year or for use in locomotives.

### Cane Transport and Unloading.

A considerable amount of cane is hauled to the mill by means of ox wagons. Some of the larger plantations supplement the supply by small gauge tramlines and portable rail. The unloading at the mill where the cane is delivered by carts is usually done by hand and the cane carrier is hand fed. Where rail cars are used the cane is lifted out of the cars in slings and dumped on to an unloading table parallel to the cane carrier and dragged off the feed table by sliding rakes.

The above embodies the general practice in the Javan mills. Further reference should be made to the report of 1924 which was distributed by the Bureau to all Queensland mills.

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## ENTOMOLOGICAL HINTS TO CANEGROWERS.

*The following monthly hints to canegrowers have been received by the Bureau of Sugar Experiment Stations from the Entomological Laboratory at Meringa:—*

Growers whose cane has suffered severely from grubs this year, and who are considering fumigating certain of their worst blocks during the early part of the coming year, are advised to place their orders for fumigants at an early date as only a limited amount is obtainable at short notice, any large quantities having to be obtained from overseas. Farmers requiring advice on the ordering of the fumigants, as to where and how obtained, and also of injectors for same, should communicate with the secretary of the Cairns Canegrowers' Association, Mr. F. C. P. Curlewis, or with the entomologist at Meringa, who will be pleased to supply details.

Attention is also drawn to the demonstration at South Johnstone of a horse or tractor drawn machine for the injection of liquid fumigants, which should prove highly satisfactory for use in cases where the growth of the grub-attacked cane will allow the passage of a horse. This demonstration is to take place at Field Day.

During this month most of the grubs will have gone deep down into the soil preparatory to pupating, and, as this state occurs at a depth of from 12 to 21 inches, they are now beyond the reach of most farm implements, and remain undisturbed by ploughing and cultivating operations.

In September and October further grub attacks will occur in patches, but this will be due to the ravages of the "frenchi" grub which does its worst damage during the months mentioned. Fumigation with carbon bisulphide is recommended for this pest as it is easier to kill than the "greyback" grub, and if the cane be fumigated, even after showing damage, it stands a good chance of recovering when the grubs have been suffocated.

During July and August also a great deal of cane appears with leaves barred in white patches. It must be noted that this state is occasioned by neither insects nor disease, but is solely due to cold weather conditions.

The Meringa Experiment Station now has tachinid flies for release on borer infested farms, and growers desiring these parasites are invited to communicate with the entomologist at Meringa regarding liberations.

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## CANE PESTS AND DISEASES.

*Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report (2nd July, 1929) to the Bureau of Sugar Experiment Stations, with reference to greyback grubs:—*

Observations made during the past fortnight at Mia Mia and several other portions of the Mackay district where grubs have wrought serious injury to cane, clearly show that their feeding season is almost over, and that they are burrowing deeper to form their pupal cells. Much further damage from these pests this season will not occur. It was surprising to note upon visiting several places that were inspected only three or four weeks previously, and where damage was very severe and extensive, that little, if any, further injury had occurred. In one particular area it was noted that the cane looked slightly better than on the previous visit; certainly an indication that the grubs were leaving the cane roots, thereby allowing the cane to form new young roots without their being eaten off. Several examinations made (mostly at Sarina) showed that the grubs were then at depths varying from 8 to 10 inches.

The two recent cold snaps have no doubt been largely responsible for causing the grubs to cease feeding, and burrow downwards to form their pupal cells. Last year some grubs were found feeding right up until July, but the weather had been milder. The minimum grass temperature this year in the middle of June was 35 deg. Fahr.

After forming their pupal cells the grubs will remain perfectly quiescent for some weeks, perhaps three months, before the actual transformations into pupæ. This period of complete inactivity is called the "pre-pupal state," and, as it progresses, the grub's body becomes more limp, till finally the skin splits along the dorsal area and peels off—a fine almost semi-transparent tissue—leaving the soft brown pupa, which, however, soon becomes hardened.

Pupal cells are found at varying depths, according to the nature of the soil and other conditions, but the average depths vary from about 12 to 18 inches. In loose and friable soils they are reported (Bulletin No. 13, Bureau of Sugar Experiment Stations) "as having been found at a depth of 4 ft., and that grubs had frequently been found in their cells at depths varying from 3 feet to 3 feet 3 inches." In soils where the subsoil is clay or other similar hard substance, the grubs would certainly not go down to that depth. Occasionally in soils that retain moisture well, as on some river flats, pupæ are sometimes ploughed up.

The pupal cells are oval in shape, and the walls inside are smooth and hardened, being lined with soil specially treated by the grub during the process of formation. The actual period spent in the pupa itself is variable, but is usually comparatively brief; records obtained from examples bred in cages at the laboratory last year gave this period as varying from four to five weeks only. Upon emergence from the pupal shell, the beetle is very soft, and as yet unable to emerge from the soil. It therefore remains quiescent within its cell—sometimes for six or eight weeks, or even longer—being almost wholly influenced by weather conditions, upon which it is dependent to enable it to break through its cell walls and thus burrow upwards.

During a long spell of dry weather, when the soil becomes hard, many beetles are thus prevented from leaving their cells, and consequently perish therein. This happens when the first summer rains are retarded and do not come at the usual time. The first good soaking rains of early summer usually bring out an emergence of beetles, but sufficient rain is required to penetrate deep enough to reach the cells in which the beetles are resting.

## MACKAY.

A cane disease survey of the Farleigh district was recently carried out by the Division of Pathology of this Bureau, with a view to assisting farmers to bring about an improvement in the disease situation. Gumming disease was found on about fifteen farms, while Mosaic disease was found to be generally distributed, and was especially prevalent in the Habana area. Farmers who have gumming on their properties should on no account plant their own seed (an exception being made in the case of Q. 813), and they have been advised to this effect privately. Individual reports have also been made to the owners of farms on which the percentage of Mosaic disease is too high to permit of seed selection.

Mosaic disease is undoubtedly causing more loss in the Farleigh district than all other diseases combined, and a determined effort should be made to bring this disease completely under control. It has repeatedly been proved that in practically every case Mosaic may be completely controlled by seed selection, clean farms, and the up-rooting of all diseased stools as soon as the disease is observed. Experiments have shown that in susceptible varieties a loss of up to 60 per cent. in weight may be expected.

The gumming disease situation is serious, especially in view of the fact that the two new canes of promise in the Mackay area—viz., P.O.J. 2714 and S.J. 4—both appear quite susceptible. In a gumming resistance trial carried out in Bundaberg last year, the following results were obtained from S.J. 4:—

Stalks dead—95 per cent.
Stalks oozing gum—5 per cent.
Stalks apparently sound—nil.

It is quite apparent that gumming disease must be cleaned up before this variety, at least, can be grown successfully.

The following farms have been inspected twice, and on each occasion were found to be free from serious diseases, with the exception of a trace of Mosaic. In cutting plants, therefore, care should be taken to avoid the odd stools of Mosaic. Care should also be taken to avoid canes infected with red rot:—

T. A. Andrews, Nindaroo; G. Annable, Hill End; Aprile and Co., Dumbleton; W. Blackburn, Habana road, Richmond; C. Blake, Habana road; E. J. Bourke, Eimeo road; Chick and Ormes, Nindaroo; T. W. Daniell, North Side; G. Davey, Mount Pleasant; E. F. Dolby, North Side; M. Donahoe, Mielere; A. Edmonds, Nindaroo; G. Farquhar, Eimeo road; Fordyce and Sons, Richmond; P. Galitte, Dumbleton, Farleigh road; Hamilton and Smith, Glenalbyn; P. W. Hand, Coningsby; A. Hansen, Richmond; H. J. C. Hansen, Pioneer; C. A. Hodge, Mount Pleasant; J. H. Jameson, Eimeo road; P. Kirwan, Dumbleton; F. Knobel, Coningsby; V. E. Kreil, Dumbleton; McGowan and Son, Dumbleton; McLeod and Sons, Farleigh; J. R. Malcolmsen, North Side; H. J. Matthews, Mielere; W. May, Shoal Point; W. T. Millard, Hill End; Mrs. S. J. Pitt, Eimeo road; T. A. Powell, Dumbleton; C. H. Rasmussen, Pioneer Estate; W. J. S. Ray, Dumbleton; E. Ryan, Dumbleton; J. Sherry, Farleigh; G. Shinn, Eimeo road; Mrs. G. Simpson, Hill End; W. Skeele, Coningsby; W. Waddington, Eimeo road; Mrs. M. A. Wilkinson, The Cedars; J. H. Woodward, The Cedars; Harry Wright, Dumbleton.

## DISEASE SURVEY OF THE BAUPLE AREA.

A cane disease survey of the Bauple area was carried out during March and April. Altogether eighty-seven farms were inspected, and of these there were only five on which no major disease was found. Mosaic disease was found on eighty-two farms, gumming disease on ten farms, and Marasmius root rot on three farms.

A comparison with the survey made in 1927 shows that the Mosaic disease situation has improved, but there is still room for a great deal of improvement. It has been proved in Queensland, and in many other countries, that in practically

every case Mosaic can be controlled by (*a*) The selection of healthy seed cane; (*b*) the uprooting of diseased canes as soon as they appear; and (*c*) keeping the fields and headlands clean.

It should be a regular farm practice to inspect the young plant and ratoon cane at intervals and uproot any stool which has Mosaic disease. The fields should also be inspected before cutting any seed cane, and any diseased stools should be marked so that they will not be cut for seed.

With the object of assisting growers to obtain supplies of clean seed, the Bureau has compiled a list of farms on which there is not more than a trace of Mosaic, and no other major disease:—

J. Bates, T. Beattie, W. G. Cocking, Mrs. H. Dempster, W. A. Henderson, J. Herbener, A. Hurt, H. Jeppesen, L. Larsen, S. Lucas, R. A. Maike, A. Mergard, J. Nicolai, E. J. O'Mara, W. H. Phillips, P. Roth, F. S. Stringer, Mrs. L. Stringer, E. Sleaford, C. W. Volmerhouse, C. J. Wood—all of Bauple.

W. W. Cunnigham, J. Howie, B. Johnson, A. Smith, D. I. Strathford, P. B. and A. L. Scougall—all of Bauple road, Tiaro.

C. Kajewski and Mrs. M. Cavanagh, Gundiah.

As stated above, there is a trace of Mosaic on most of these farms, and, therefore, care should be taken to avoid the diseased stools at the time of cutting the cane for seed.

Although the amount of Mosaic has been reduced, the position with regard to gumming disease is alarming. This disease has now been found on ten farms, and, unless the required precautions are taken, it will assuredly continue to spread. Gumming disease is probably the most serious cane disease there is, and is certainly the worst disease in Southern Queensland, where it has caused a very great deal of loss, particularly in the Bundaberg district. There is no reason to believe that it will not cause as much, or greater loss, in Bauple.

The best known symptom of gumming disease is the oozing of gum from the cut ends of the stalk, but this is one of the last stages of the disease. The disease may be recognised in the field in its early stages by a particular kind of streak upon the leaves. These streaks may be up to a quartar of an inch wide, but are usually less, and vary in length from a couple of inches to almost the whole length of the leaf. Streaks may arise anywhere in the leaf, but generally commence at the margins, towards the tip of the leaf, and work downwards. The streaks follow the course of the large veins of the leaf and so run straight, and at an angle to the mid-rib. Their colour is yellowish-brown to yellow, usually dotted with a large number of small red blotches. Young streaks are best found after wet windy weather, but old dead streaks are common at this time of year; they are not found on the very youngest leaves.

Gumming is usually spread from plant to plant through scratches in the leaves during wet weather. It may be spread from field to field by flies and other insects, and on cane knives. Care should therefore be taken to sterilise cane knives in boiling water, or in 1 per cent. Phenyle, after having cut gummed cane; the bacteria which cause gumming disease have been found alive on cane knives six months after the knives were used. Farmers with gumming-free farms should not allow purchasers of seed cane to use their own knives when cutting cane in clean fields.

At certain times of the year it may be impossible to find any symptoms of gumming disease, although the field is known to be gummed. It is for this reason that once the symptoms have been found, all that field, and any cane within a quarter of a mile, are unsafe for seed unless of a highly resistant variety. Q. 813 is a resistant variety, and the ten farmers on whose properties this disease has been found are advised to plant this cane. If they desire to plant other varieties they should on no account plant their own seed, but should purchase it from one of the farmers in the above list.

Gumming was found mainly in the varieties D. 1135 and E.K. 28. E.K. 28 is one of the most susceptible varieties grown, and any farmer planting this variety should be doubly careful. If gumming is already on the farm this variety should be given up.

Every effort should be made to restrict the spread of this disease, and gradually eradicate it. There may be many varieties suitable to this district, but could not be introduced on account of their susceptibility to gumming disease.

## SUGAR PRODUCTION—QUEENSLAND, 1928.

The Registrar-General (Mr. Geo. Porter, F.S.S.) has supplied the following statistics showing the result of the 1928 sugar crop:—

Thirty-five mills were again in operation during the 1928 crushing season, and the tabulation of details contained in returns received from each of these shows a total production of 520,620 tons of sugar net titre. This exceeds the estimate issued from this office on the 15th December last by 5,486 tons, and is 34,875 tons in excess of the production for the 1927 season, which was the previous record year.

As forecast in the estimate, production increased in the northern portion of the State, that is as far south as Mackay, including the sugar-growing areas in the Agricultural Divisions of Rockingham and Edgecumbe, but decreased in the southern portion, which includes the sugar-growing areas in the Wide Bay and Moreton Agricultural Divisions.

The following table shows the particulars of the crushing in the sugar-growing districts of the State during 1927 and 1928:—

| Division. | Tons of Cane. | | Tons of Sugar at 94 Net Titre. | |
|---|---|---|---|---|
| | 1928. | 1927. | 1928. | 1927. |
| Rockingham .. | 1,863,877 | 1,607,546 | 255,188 | 224,599 |
| Edgecumbe.. .. | 1,266,428 | 1,242,008 | 184,343 | 174,836 |
| Wide Bay .. .. | 566,494 | 644,325 | 75,850 | 78,757 |
| Moreton .. .. | 39.512 | 61,948 | 5,239 | 7,553 |
| Total State .. | 3,736,311 | 3,555,827 | 520,620 | 485,745 |

Note.—The above figures for tons of cane show the tonnage crushed at mills situated in the above districts, not the actual tonnage grown in each district. A table showing this information will be published later in the Agricultural Report. The total for State is, however, final.

It is estimated that 224,366 acres were cut for crushing in 1928 (mill estimate only, final figures not yet available), as against 203,748 acres in 1927.

There was an increase of 180,484 tons in cane crushed, and an increase in sugar made of 34,875 tons at 94 n.t., compared with the previous season.

It would appear that the increased production in 1928 was not due to heavier rainfall, as the undermentioned particulars would seem to indicate a lighter rainfall in 1928 than in 1927 throughout the sugar-growing districts.

| Station. | District in which Situated. | Rainfall (Inches) | |
|---|---|---|---|
| | | 1927. | 1928. |
| Innisfail .. .. .. | Rockingham .. .. | 146·2 | 125·3 |
| Mackay .. .. .. | Edgecumbe .. .. | 89·3 | 84·9 |
| Bundaberg .. .. .. | Wide Bay .. .. .. | 66·0 | 41·0 |
| Brisbane .. .. .. | Moreton .. .. .. | 62·1 | 52·7 |

It is not claimed that the above stations are necessarily truly representative of the weather conditions prevailing in the sugar-growing areas in which each is situated, but they happen to be stations for which comparative figures are at the moment readily accessible. Furthermore, a true comparison of production and weather conditions would need to take into account the periods during which rain fell compared to time of planting, state of growth, and so forth.

The following table shows the tons of sugar made at 94 n.t. in each division of the State at five-year intervals since 1910. An examination of the figures will emphasise the expansion of the industry during that period.

| Year. | Rockingham. | Edgecumbe. | Wide Bay. | Moreton. | Total. |
|---|---|---|---|---|---|
| 1910 .. .. | 57,135 | 77,062 | 68,861 | 7,698 | 210,756 |
| 1915 .. .. | 58,677 | 44,156 | 32,951 | 4,712 | 140,496 |
| 1920 .. .. | 100,865 | 52,970 | 11,196 | 2,370 | 167,401 |
| 1925 .. .. | 216,755 | 171,511 | 85,360 | 11,959 | 485,585 |
| 1928 .. .. | 255,188 | 184,343 | 75,850 | 5,239 | 520,620 |

A further table is appended showing the percentage of production in each district to the total production of the State in five-year periods:—

| Period. | Rockingham. | Edgecumbe. | Wide Bay. | Moreton. |
|---|---|---|---|---|
| 1909-13 .. .. .. | 29·74 | 35·62 | 31·77 | 2·87 |
| 1914-18 .. .. .. | 39·70 | 33·78 | 24·13 | 2·39 |
| 1919-23 .. .. .. | 50·33 | 31·93 | 15·63 | 2·11 |
| 1924-28 .. .. .. | 48·55 | 33·58 | 15·88 | 1·99 |

This table shows the increased relative importance of production in the far North (Rockingham) to the total production for the State in the later periods, compared to 1909-13.

The yield per acre for 1928 season is estimated at 16.65 tons of cane, or 2.32 tons of sugar at 94 n.t., but as the mill estimates of acreage have been used in these calculations, the figures are liable to revision when final acreages are available.

The average tons of cane required to make 1 ton of sugar was 7.18, which is an improvement on previous years.

Comparative figures for five years are:—

| Year. | To Each Acre Crushed. | | Tons of Cane to Make One Ton of Sugar. |
|---|---|---|---|
| | Tons Cane. | Tons Sugar. | |
| 1924 .. .. .. .. .. | 18·92 | 2·44 | 7·75 |
| 1925 .. .. .. .. .. | 19·36 | 2·56 | 7·55 |
| 1926 .. .. .. .. .. | 15·45 | 2·06 | 7·52 |
| 1927 .. .. .. .. .. | 17·54 | 2·38 | 7·32 |
| 1928 .. .. .. .. .. | *16·65 | *2·32 | 7·18 |

* Estimates only.

In addition to sugar made, the output of molasses from the mills during the year amounted to 16,873,372 gallons, which was disposed of as follows:—

| | Gallons. |
|---|---|
| Sold to distilleries .. .. .. .. .. .. | 5,103,471 |
| Sold, &c., otherwise .. .. .. .. .. .. | 573,350 |
| Burnt as fuel .. .. .. .. .. .. | 5,131,726 |
| Food for stock .. .. .. .. .. .. | 2,524,136 |
| Used for manure .. .. .. .. .. .. | 7,200 |
| Held in stock .. .. .. .. .. .. | 488,600 |
| Run to waste .. .. .. .. .. .. .. | 3,044,889 |

# PESTS OF CITRUS.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

The citrus orchards of Queensland frequently suffer from severe insect infestations which are responsible for more or less serious losses to the orchardists. Some of the pests in question are practically cosmopolitan introduced insects, whereas others are native species which have turned their attention from indigenous wild host plants to cultivated orchard trees.

Among the more important citrus insects that are worthy of consideration in these notes are the bronzy orange bug, the "Maori" mite, the orange-piercing moths, the red scale, the citrus root-bark channeller, the Queensland fruit fly, the pink wax scale, and plant lice. Quite a number of other insects and allied pests of citrus exist in this State, but for present purposes attention will be confined to those just mentioned.

## The Bronzy Orange Bug.

The insect known as the bronzy orange bug was recorded as far back as 1889 as a pest on citrus in the Toowoomba district. It has since been found injuring citrus in many different orcharding centres in Queensland, and it has also been recorded from the neighbouring State of New South Wales. It has in recent years been particularly abundant on the Blackall Range in this State.

The bronzy orange bug belongs to the Pentatomidæ in the order Hemiptera, and is known to science as *Oncoscelis sulciventris* Stål.

### Feeding Habits and Nature of Injury.

As is the case with all the members of the order to which this pest belongs, feeding takes place by means of piercing mouth-parts. The epidermis or skin of the host plant is pierced, and through the rupture thus made the bug extracts the plant sap.

Field observations suggest that the bugs confine their attention to young and tender growth. They are found feeding on stems and leaves of young twigs and on flower and fruit pedicels, and they may also attack the young fruit.

The effect produced by the feeding of the bugs is typical of the class to which they belong. The attacked twigs (Plate 44) wilt and shrivel up, and the buds and young attacked fruit drop off. When the bugs are present in the numbers that have been recorded in certain orchards in the Blackall Range district, it is not difficult to appreciate the serious situation that may be created by the activities of this pest.

Oranges, mandarins, and lemons are all attacked by this serious pest. It is believed to be a native of Australia, and the suggestion has been made that it feeds on native species of Rutaceæ. Its association with native plants is, however, worthy of further consideration.

### Life Cycle Stages and Life History.

As this insect belongs to the Hemiptera it possesses what is known as an incomplete metamorphosis. In insects of this class the newly hatched wingless individual or nymph bears some slight degree of resemblance to the mature winged insect, into which it will gradually transform

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

PLATE 44.—ORANGE TWIG ATTACKED BY THE BRONZY ORANGE BUG (*Oncoscelis sulciventris* Stål).

during a period of growth that is accompanied by a series of moults. The life cycle of this species may thus be divided into three distinct stages; firstly there is the egg, followed by the wingless nymph, which after a series of moults produces the winged adult.

### The Eggs.

The green, shiny, spherical-shaped eggs (Plate 45, fig. A) are laid in rows in small masses, the number in each egg cluster being usually extraordinarily constant at fourteen. The eggs are laid on the foliage in summer anywhere on the tree, the under sides of the leaves being generally chosen for oviposition. The eggs pass through the usual incubation period, which is recorded by Tryon as being eight or nine days.

### The Nymphs.

At the end of the incubation period the eggs hatch and the very small nymphs emerge. These are green in colour and are oval and somewhat convex in shape. They remain together without dispersing over the foliage, and it is believed that they either do not feed at all or, if they do, they partake but sparingly of food. A further noteworthy characteristic of these first-stage nymphs is the fact that they are very easily disturbed and will drop to the ground on the slightest provocation. The duration of this first stage is somewhat uncertain, but it is evidently brief and the nymphs then moult into the second stage.

The second-stage nymph resembles the first stage in its green colour, but it is very much flatter in shape and it clings extremely closely to the under surface of the leaf on which it is resting. It is by no means readily shaken from the host tree, and it further differs from the first stage in that it disperses over the foliage instead of the individuals of each egg cluster remaining close together. It is in this stage that the insect passes the winter in a state of inactivity. The nymph in this stage resembles the leaf so wonderfully in colour, and is so closely adherent thereto, that its presence even in very considerable numbers cannot be detected without careful examination. The second-stage nymphs, which have passed the winter in a state of inactivity, commence to crawl about in search of food late in August or early in September. By that time the citrus should be showing some tender young shoots, and it is on these shoots that the second-stage nymphs now commence feeding.

The third-stage nymph has its body decidedly flattened like the second-stage nymph. Observations by A. A. Girault in the Blackall Range district, in the spring of 1923, showed that by the end of September the great majority of the bugs that had hibernated as second-stage nymphs had moulted into the third stage.

The same records showed that by the end of October approximately half the bugs were in the fourth nymphal stage, while the remaining half were in the fifth. A few were still in the second and third stages, while one adult was found.

Nymphs in the fourth and fifth stages show distinct signs of the development of the wing-buds, and their colour scheme possesses certain features distinguishing these two stages from the three earlier ones.

The various nymphal stages are illustrated in Plates 45 and 46.

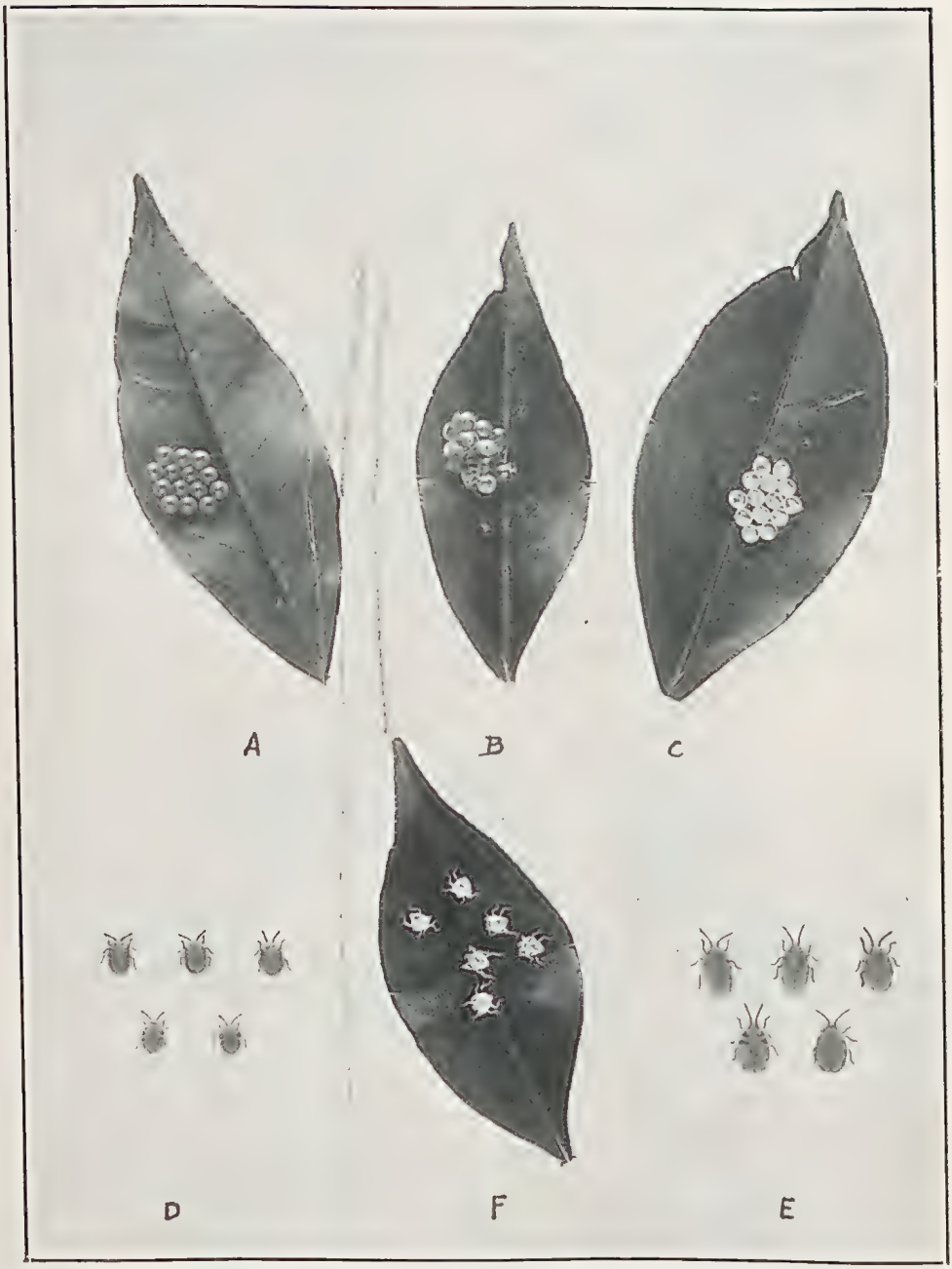


Plate 45.—The Bronzy Orange Bug (*Oncoscelis sulciventris* Stål).

Fig. A.—Egg cluster.
Fig. B.—Eggs hatching.
Fig. C.—Empty eggshells.
Fig. D.—Young nymphs.
Fig. E.—Somewhat older nymphs.
Fig. F.—Cast nymphal skins.

### THE ADULT.

The adult bug (Plate 46) is just about an inch in length, and its colour scheme is somewhat appropriately described by its popular name of bronzy orange bug. There is little to distinguish the two sexes, although the male is generally considered to be smaller than the female. The under side of the abdomen in the female also possesses a median channel which does not occur in the male.

In the 1923 observations in the Blackall Range the first adults were found at the end of October, and from then on until midsummer there was a steadily increasing percentage of adults. The adults in both sexes are voracious feeders.

### SUMMARY OF LIFE HISTORY AND HABITS.

The green spherical-shaped eggs are laid in clusters of fourteen on the under sides of leaves in summer, After an incubation period of some eight or nine days the eggs hatch, yielding small green nymphs which remain clustered together and apparently make little or no attempt at feeding. These then moult into the second-stage nymphs, which scatter over the host plant and pass the winter in a state of inactivity. In spring these second-stage nymphs commence to feed on the tender young shoots and then moult successively into the third, fourth, and fifth nymphal stages and finally transform to the winged adults, which mate and lay their eggs in summer, thus recommencing the life cycle. There is thus only one generation each year.

### CONTROL MEASURES.

Much relief from this pest has been obtained by the adoption of the system of banging, accompanied by the cincturing or banding of the trees after banging. A padded mallet is used in order to sharply jar the various branches of infested trees, care being taken to ensure that the branches are not injured in the course of the operation. This work is best performed in spring-time, when third and fourth stage nymphs predominate. The nymphs in these stages will fall to the ground rather readily, and when that has been accomplished steps must be taken to prevent these wingless nymphs returning to the trees. This object may be achieved by building an earthen cone round the base of each tree, say 9 or 10 inches high, and then partially cutting the cone away so as to leave a steep face about 5 or 6 inches high up which the bugs cannot readily crawl. The return of the bugs may also be prevented by banding the tree with bands carrying sticky substances that will form a barrier which the bugs cannot cross. Tanglefoot has been used for that purpose. Some orchardists destroy the fallen nymphs by scorching them up with a blow-lamp, and this additional precaution ensures that there will be no possibility of return by some of the nymphs succeeding in crossing the bands or earthen cones. Bands are preferable to earthen cones.

The 1923 observations already referred to included spraying experiments, and these demonstrated the fact that, under the conditions then prevailing, spraying was not effective for the control of this insect.

Readers who desire further details with respect to this pest should consult the reports published by Tryon and Girault on the results of their investigations in 1923.

Plate 46.—Nymphal Stages and Adults of the Bronzy Orange Bug (*Oncocelis sulciventris* Stål).

### The Citrus Rust Mite or "Maori" Mite.

Quite frequently oranges and lemons are found to be infested by a small mite known variously as the citrus rust mite, "Maori" mite, fruit mite, orange rust mite, or silver mite (*Phyllocoptes oleivorus* Ashm.). The oranges attacked by these mites acquire a characteristic dark-brownish tinge and are generally referred to in Queensland as "Maori" oranges.

No details are available with respect to the life history of this mite in Queensland, but in California some considerable information has been published thereon. Briefly it is to the effect that the extremely small circular and somewhat yellowish eggs are laid on the fruit or foliage either singly or in small clusters. These eggs hatch out after an incubation period of about a week in the warmer weather, and by a succession of moults the mites attain full size in some two or three weeks. Their breeding season lasts from spring till late in autumn, and thus a large number of broods are produced every year.

The individuals of this species are extremely small, light-yellowish, four-legged mites; they are indeed so small that they can be observed only by means of a lens, being invisible to the naked eye. Their presence, therefore, can most easily be detected by the effects produced by their feeding. Both the immature forms and the adults of the citrus rust mite pierce the oil-cells and feed on the oil. The bark, the foliage, and the rind of the fruit are all attacked in the search for food, and as the mites sometimes occur in enormous numbers they can cause appreciable damage. As a result of their presence on the fruit, this is stained the brown or dark brown that is characteristic of the "Maori" orange. The appearance of the fruit that has been discoloured by this infestation is undoubtedly by no means attractive, but the quality of the fruit is not necessarily impaired.

With regard to control, this may be effected by spraying with a weak solution of lime sulphur or by dusting with sulphur. Citrus rust mite, however, is generally quite a minor pest of citrus.

### The Orange-piercing Moth.

The orange-piercing moth (*Othreis fullonica* Linn.) and two other allied moths of similar feeding habits—namely, *Mænas salaminia* Fab. and *Argadesa materna* Linn. (Plate 49)—frequently appear in very large numbers in citrus districts during the autumn months. They are large handsome moths possessing the exceptional power of being able to pierce the rind of fruit and to extract the juices through the punctures thus made. The sucking or sipping of juices is, of course, quite the normal procedure in moths, the abnormality in this case being the power to pierce the rind of the fruit in order to obtain fruit-juice. An examination of the proboscis of one of these moths readily discloses the fact that it is highly specialised to permit of this habit, so unusual in moths. A discussion of the details of the modification of the proboscis, however, is quite unnecessary in these notes, although it is of great scientific interest.

The moths themselves are large, exceptionally handsome species that are well illustrated in the accompanying photographs (Plates 47 and 49). The larva of *Othreis fullonica* is quite in keeping with the moths so far as appearance is concerned, for it is a particularly handsome caterpillar (Plate 48).

Plate 47.—The Orange-piercing Moth (*Othreis fullonica* Linn.).
Male and Female Moths.

The larvæ feed on various native plants, and are themselves of no economic importance except by virtue of the fact that they develop into the moths that attack fruits of certain cultivated plants. The fruit-piercing moths have been recorded as attacking citrus, bananas, and mangoes. During the autumn of 1927 they were particularly destructive throughout coastal Queensland.

For the control of this pest, perhaps the best that can be done is to capture the moths at a lure. For this purpose over-ripe bananas, of which they are particularly fond, may be used, and these should be placed in suitable spots, visited daily after dark, and the moths feeding on them captured and destroyed. Small pieces of water-melon have also been strongly recommended as a lure; these have to be similarly visited and the moths destroyed. To obtain maximum results from this operation it should be commenced very early in the season.

If it is practicable to do so, the native plants on which the caterpillars of these moths are feeding should be destroyed.

### The Red Scale.

The red scale (*Chrysomphalus aurantii* Maskell) is without doubt one of the most serious pests of citrus in Queensland, and indeed it may even be regarded as worthy of classification among the world's most destructive citrus insects. It is now practically world-wide in its distribution, at least so far as the tropical and semi-tropical regions are concerned. As is not unusual in the case of insects that have become widely distributed throughout the world, there is some considerable uncertainty with respect to its native home. It is not regarded, however, as being indigenous to Australia, and it would seem that evidence exists in favour of the belief that it originally came from China or elsewhere in the Far East.

This scale does not confine its attention to citrus, but it is as a pest of citrus that it has acquired its unenviable reputation. Other plants attacked include apple, pear, quince, plum, fig, olive, coconut, and rose. As already indicated, however, it is not a pest of importance except on citrus.

The effect of red scale, if allowed to multiply without the check administered by the application of control measures, is usually very serious. It attacks all parts of the tree, i.e., the foliage, the fruit, and the branches, and when a tree is severely infested many of the leaves will be shed and many branches killed. A tree that is so affected is naturally of little profit to an orchardist, and what fruit is produced is unattractive and frequently unsaleable. This scale insect does not excrete honeydew, and hence its presence is not accompanied by the occurrence of fumagine or sooty mould. Fumagine is the term applied to a fungus that grows on the honeydew or sweet substance excreted by certain species of scale insects. Fumagine does not attack the plant tissue, and apart from the unsightly appearance produced it is of relatively little consequence.

The red scale is viviparous—i.e., no eggs are laid and the young appear as very small larvæ. These are sulphur yellow in colour and possess three pairs of legs, thus enabling them to move about in search of a suitable spot at which to settle down. When that has been obtained they commence to form the scale covering which gives these insects their popular name. Under these scales the insects develop to maturity, the

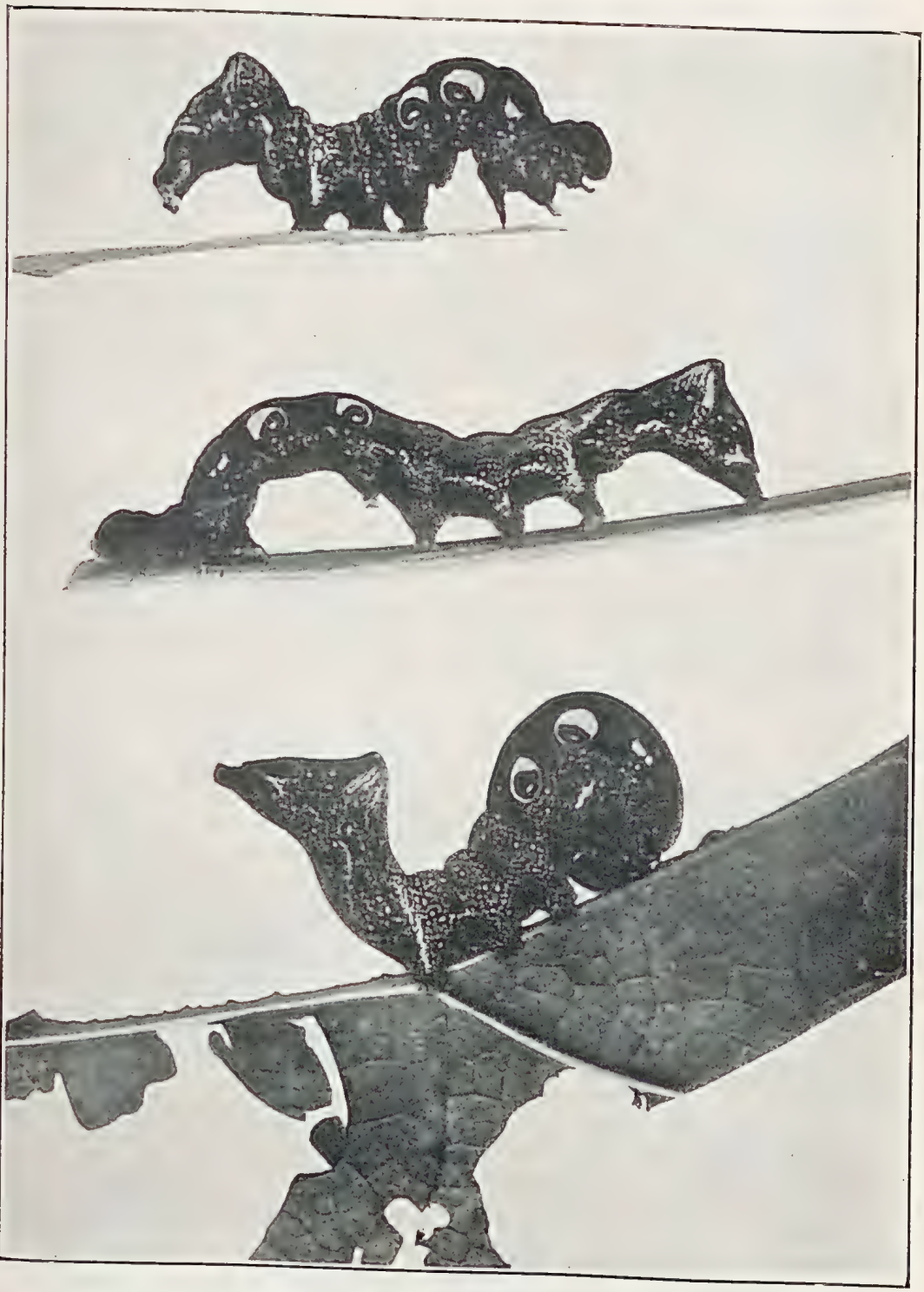

Plate 48.—Larvæ of the Orange-piercing Moth (*Othreis fullonica* Linn.).

female adults becoming rather degenerate legless and wingless insects. The adult males are totally different in appearance, and possess a pair of wings and three pairs of legs by means of which they are able to travel from tree to tree in search of mates. Although the power of flight of the winged male is slight it is frequently transported long distances by wind. The scale of the full-grown female is about $\frac{1}{12}$ inch or slightly more in diameter and is distinctly circular in shape. It is transparent, and this fact allows the red colour of the female insect to be seen quite clearly, hence the popular name of the red scale. The scale covering the immature male insect is smaller than the scale of the female, and is elongate in shape rather than circular.

With respect to control, fumigation with hydrocyanic acid gas can be strongly recommended. Fumigation is discussed in some detail in the chapter dealing with insecticides. Spraying is also adopted for the control of this pest, resin wash and miscible oils being used for that purpose.

### The Citrus Root-bark Channeller.

Like the notorious banana weevil borer, this citrus pest belongs to the Curculionidæ. It was technically described in 1920 as *Decilaus citriperda* H.T., but it is more commonly known among orchardists as the citrus root-bark channeller. It appears to have first become the subject of attention as far back as 1908, and since that date it has frequently figured in routine inquiries regarding the control of injurious insects. Reference to its attacks on citrus appears to come mainly from the Blackall Range, although recently a number of inquiries have been received from elsewhere on the North Coast.

#### Nature of Injury.

The examination of an attacked tree readily provides evidence of the nature of the injury if the base of the stem and the roots in proximity thereto are inspected. It will then be seen that a number of channels have been excavated at the base of the stem and on the surface of the roots, and that on the latter the channels may extend outwards for several feet from the base of the stem. In the case of an old attack the channel is exposed by the decay of the thin layer of bark that originally covered it, but in a more recent infestation the outer layer of the bark is still present, and on that account the extent of injury may be somewhat masked. It may be further observed that in many of the older attacks the infested trees have attempted to heal the wounds, and these efforts have in some instances been attended with a certain measure of success.

The inspection of infested roots has so far shown that, although frequently quite a considerable number of individual channels may exist in the one root, they do not run into each other and ringbarking is not associated with infestation. This is a somewhat fortunate feature in the feeding habits of the citrus root-bark channeller, and it rather mitigates the seriousness of its presence in an orchard. Were a ring-barking effect typical of its presence it would be a more serious pest than it is. Nevertheless the infestation on a root may frequently be so very considerable as to practically completely destroy it, and obviously when a number of roots of one tree are so attacked the growth of the tree and the production of fruit must be very seriously retarded.

### Trees Attacked.

The roots of both orange and mandarin trees are attacked, and it also seems probable that this pest feeds on the roots of some native species of plant or plants. This supposition has not yet been confirmed, but nevertheless the citrus root-bark channeller is believed to be a native species of weevil that has transferred its attention from a native host plant to cultivated citrus trees.

The information accumulated to date rather tends to support the belief that this weevil favours the older trees, and that young citrus, if attacked at all, is but slightly infested. It has also been thought that, in the older trees, lack of vigour may be a predisposing factor to severe infestation; this lack of vigour may be the result of growth under unfavourable circumstances such as unsuitable soil conditions, lack of attention, or unfavourable seasons. The whole question of the incidence of infestation appears, however, to warrant further attention.

### Life Cycle Stages.

Beetles possess four distinct stages in their life cycles, each of these stages having very definite functions to perform; they are the egg, larva, pupa, and adult or beetle. The second stage, i.e. the larva or grub, is the one in which the damage is done to the roots of citrus by the particular species at present under discussion. It is creamy white in colour, legless, and otherwise rather featureless, and measures about $\frac{1}{3}$ inch in length. The pupa is characteristic of its class, and in it the legs, wings, and head of the future beetle can be clearly seen. The beetle itself is a typical black weevil measuring roughly about $\frac{1}{4}$ inch in length.

### Control Measures.

In attempting to control this pest the orchardist may adopt either or both of two courses. He may endeavour to stimulate the growth of the infested trees, thus enabling them to better resist and repel the infestation, or he may attempt to destroy or drive off the weevils responsible for the damage.

If this pest, as there is good reason to believe, is more commonly met with in the older trees that are in a state of decline as a result of adverse conditions other than root-bark channeller infestation, then the adoption of the first-mentioned alternative seems worthy of serious consideration. Anything that would tend to eliminate these unfavourable conditions would thus check the tree's decline in vigour, and would therefore help to alleviate the insect infestation. If the trees are suffering from unfavourable soil conditions, efforts should if practicable be made to counteract these adverse soil conditions; if cultural practices have been faulty these should be rectified; and if scale infestation is heavy that should be remedied by fumigation or by suitable spraying. Even if the old trees that are attacked are otherwise perfectly healthy, their growth should be stimulated to enable them to withstand the attack.

The alternative to these measures is to attempt to destroy the insects by the adoption of some form of soil fumigation. It must, however, be pointed out that so far no satisfactory system of soil fumigation has yet been demonstrated for the control of this pest, and all that can be done is to record lines along which possible experiments might be conducted. For this purpose paradichlorobenzene seems worthy of some

investigation, and indeed preliminary trials with this fumigant have already been carried out. These, however, will have to be followed up before any definite expression of opinion is possible. It will be necessary to determine, firstly, just how effective that fumigant really is for this particular purpose, secondly, what are the minimum doses that can produce the required results, and, thirdly, just how safe it is for application to citrus trees. It may be added that paradichlorobenzene has been demonstrated to be a very useful fumigant for a number of soil-infesting insects.

### The Queensland Fruit Fly.

The Queensland fruit fly (*Chætodacus tryoni* Froggatt) is frequently the cause of very considerable losses in citrus fruits, the losses occurring mainly in the late and early crops. The eggs are laid in small punctures in the fruit, and the maggots hatching therefrom feed voraciously, thus obviously rendering the fruit valueless for marketing. This highly destructive insect has already been dealt with in very considerable detail in Chapter VII. Its life history and control are discussed therein, and further reference to this pest is unnecessary in these notes as the full details can be obtained in the chapter mentioned.

### The Pink Wax Scale.

This very conspicuous scale insect (*Ceroplastes rubens* Maskell) is a common pest throughout coastal Queensland on mandarins, oranges, and lemons, and it is also one of the pests most frequently associated with the mango. The fully developed scale is slightly more than $\frac{1}{8}$ inch in length and is pink in colour. What is seen by the orchardist is not really the scale insect, but is the very heavy hemispherical coating of wax with which it has covered itself. Beneath that protective layer is the actual insect; the young insects belonging to this species do not of course possess this heavy protective covering, but they gradually acquire it during the process of growth. This species was originally described from specimens obtained in Australia, but, in spite of that fact, some authorities do not consider it to be a native of this country.

The feeding of this insect on the foliage of the trees which it infests is always associated with the presence of what is known as fumagine or sooty mould. The pink wax scale secretes a sweet sugary substance, and on this secretion there grows a black fungus which gives to the attacked tree an unsightly, dirty appearance. (This fungus is further discussed at the end of this chapter.)

Although the pink wax scale is not nearly so injurious to citrus as the red scale, it is nevertheless decidedly harmful, partly because of the actual weakening of the attacked tree and partly because of the production of the unsightly fumagine referred to. Steps should therefore be taken to control this pest, and for that purpose spraying with soda-wash or resin-wash can be recommended.

The spraying should be done at a time when large numbers of young insects are hatching out, because, as already indicated, the young scales have little or no protective covering, and they are then much more vulnerable than they will be at a later stage in their development.

The preparation of resin-wash has already been dealt with in Chapter 3. The soda-wash may be prepared in accordance with the following formula:—1½ lb. of washing soda to 4 gallons of water. Only clean, fresh washing soda should be employed when mixing this spray, otherwise if old washing soda is used considerable damage may be done to the foliage of the treated trees.

Plate 49.—*Mœnas salaminia* Fabr.
*Argadesa materna* Linn. (Male and Female.)

## Aphis.

Plant lice or aphids not infrequently attack the tender young twigs of citrus trees, and as a result of their feeding thereon the leaves curl up and the twigs shrivel and die if the infestation is allowed to continue. Frequently the attack is confined to a few twigs and it sometimes disappears quite suddenly. Should that not be the case, the plant lice may be controlled by spraying with nicotine sulphate.

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of June in the Agricultural Districts, together with Total Rainfall during June, 1929, and 1928, for Comparison.

| Divisions and Stations. | Average Rainfall. June. | Average Rainfall. No. of Years' Records. | Total Rainfall. June, 1929. | Total Rainfall. June, 1928. |
|---|---|---|---|---|
| *North Coast.* | | | | |
| | In. | | In. | In. |
| Atherton | 1·62 | 28 | 1·29 | 0·28 |
| Cairns | 2·79 | 47 | 2·60 | 0·58 |
| Cardwell | 2·05 | 57 | 1·46 | 0·94 |
| Cooktown | 2·00 | 53 | 2·02 | 0·35 |
| Herberton | 1·04 | 42 | 0·87 | 0·24 |
| Ingham | 2·36 | 37 | 1·60 | 2·14 |
| Innisfail | 7·11 | 48 | 4·09 | 1·73 |
| Mossman | 2·05 | 16 | 1·76 | 0·77 |
| Townsville | 1·30 | 58 | 2·03 | 0·48 |
| *Central Coast.* | | | | |
| Ayr | 1·41 | 42 | 3·24 | 0·75 |
| Bowen | 1·61 | 58 | 1·81 | 0·06 |
| Charters Towers | 1·29 | 47 | 1·76 | 0·22 |
| Mackay | 2·68 | 58 | 2·41 | 1·43 |
| Proserpine | 3·41 | 26 | 2·49 | 1·17 |
| St. Lawrence | 2·42 | 58 | 6·87 | 0·96 |
| *South Coast.* | | | | |
| Biggenden | 2·18 | 30 | 1·97 | 4·73 |
| Bundaberg | 2·83 | 46 | 3·36 | 5·25 |
| Brisbane | 2·78 | 78 | 4·40 | 2·22 |
| Caboolture | 2·64 | 42 | 3·45 | 2·56 |
| Childers | 2·51 | 34 | 1·38 | 4·65 |
| Crohamhurst | 4·43 | 36 | 4·66 | 2·77 |
| Esk | 2·21 | 42 | 3·05 | 2·79 |
| Gayndah | 1·87 | 58 | 1·07 | 2·87 |
| Gympie | 2·67 | 59 | 2·63 | 3·88 |
| Kilkivan | 2·17 | 50 | 0·97 | 2·85 |
| Maryborough | 3·01 | 57 | 2·55 | 5·74 |
| *South Coast—continued:* | | | | |
| Nambour | 3·64 | 33 | 3·08 | 2·88 |
| Nanango | 2·08 | 47 | 1·38 | 2·63 |
| Rockhampton | 2·19 | 42 | 10·39 | 1·27 |
| Woodford | 2·86 | 42 | 3·52 | 2·46 |
| *Darling Downs.* | | | | |
| Dalby | 1·71 | 59 | 1·15 | 1·69 |
| Emu Vale | 1·49 | 33 | 2·73 | 1·60 |
| Jimbour | 1·74 | 41 | 1·41 | 1·89 |
| Miles | 1·86 | 44 | 0·75 | 1·45 |
| Stanthorpe | 1·92 | 56 | 1·65 | 2·60 |
| Toowoomba | 2·44 | 57 | 1·38 | 1·88 |
| Warwick | 1·78 | 64 | 1·91 | 1·59 |
| *Maranoa.* | | | | |
| Roma | 1·66 | 55 | 0·61 | 1·70 |
| *State Farms, &c.* | | | | |
| Bungeworgorai | 1·55 | 15 | 0·43 | 1·84 |
| Gatton College | 1·88 | 30 | 1·47 | 1·95 |
| Gindie | 1·48 | 30 | 2·91 | 1·19 |
| Hermitage | 1·90 | 23 | 1·78 | 1·46 |
| Kairi | 1·47 | 15 | 1·42 | 0·19 |
| Mackay Sugar Experiment Station | 2·37 | 32 | 2·54 | 1·11 |
| Warren | 2·29 | 14 | 0 | 0 |

GEORGE G. BOND,
Divisional Meteorologist.

## QUEENSLAND SHOW DATES, 1929.

Nundah: 3rd August.
Redcliffe: 9th and 10th August.
Royal National: 12th to 17th August.
Crow's Nest: 21st and 22nd August.
Wynnum: 30th and 31st August.
Goombungee: 30th August.
Imbil: 4th and 5th September.
Zillmere: 7th September.
Stephens: 14th September.
Malanda: 18th and 19th September.
Pomona: 18th and 19th September.
Beenleigh: 20th and 21st September.
Rocklea: 28th September.
Kenilworth: 28th September.
Enoggera: 5th October.
Pine Rivers: 15th and 16th November.

# DISEASES OF CITRUS.*

By J. H. SIMMONDS, M. Sc., Plant Pathologist.

The diseases dealt with in this chapter are black spot, melanose, blue mould, scab, exanthema, die back, collar rot, and sooty mould.

## Black Spot.

Black spot is a fruit disease to which most commercial varieties of citrus are subject. Old trees of the common seedling orange are probably the most seriously affected, and with these black spot is often responsible for considerable fruit disfigurement.

### Symptoms.

An indication of the presence of black spot often overlooked is a somewhat scanty brown spotting of the leaves which may be present at various times throughout the year. The characteristic spotting of the fruit takes place when the latter is approaching maturity, and appears first as scattered, minute, pink or reddish-brown spots on the surface of the rind, usually with a definite and somewhat darker margin. These enlarge to a more or less circular area $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter. The central portion becomes shallowly depressed, and as the spot matures this region assumes a greyish colour, leaving only a narrow rim of the original brown.

If conditions are suitable, the fruiting bodies of the fungus causing the disease may be developed even in the early stages of spot formation. These make their appearance on the depressed areas in the form of minute, translucent, dome-shaped blisters which gradually darken until they become sooty black in colour. The small, grey depressed spot with a narrow brown rim, and studded on its surface with black points just visible to the naked eye, is quite characteristic of this disease. (Plate 50.)

Under conditions favouring the growth of the fungus, a diffuse browning may spread out from the margin of the spots, and, if the latter are numerous, coalescence and spreading may take place until a large proportion of the skin shows a brown and somewhat shrunken area over which are speckled the black points of the fruiting bodies. This latter effect is seen more especially on ripe fruit after storage, or on fruit which has fallen to the ground.

### Cause.

Black spot is caused by a fungus (*Phoma citricarpa*) first described by McAlpine, the Victorian Plant Pathologist, in 1899. The fruiting bodies arise just beneath the surface of the depressed spots, and take the form of small flask-shaped receptacles known as pycnidia. It is the black walls of these pycnidia which show up as the characteristic black points mentioned above. From the inner lining of these structures are produced numerous minute, clear, oval spores which are extruded through an opening at the apex and thus serve to spread the disease.

The spotting resulting from an attack of this fungus does not usually appear until the fruit is commencing to colour, and becomes increasingly prevalent as the weather becomes warmer. For this reason greatest loss is sustained in fruit held for a late market.

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

### Effects.

Although black spot does not usually penetrate beyond the outer region of the rind leaving the edible qualities unaffected, it nevertheless produces disfigurement sufficient to cause considerable reduction in price. After storage the spotting may spread, to give rise to a larger brown area of a more serious nature.

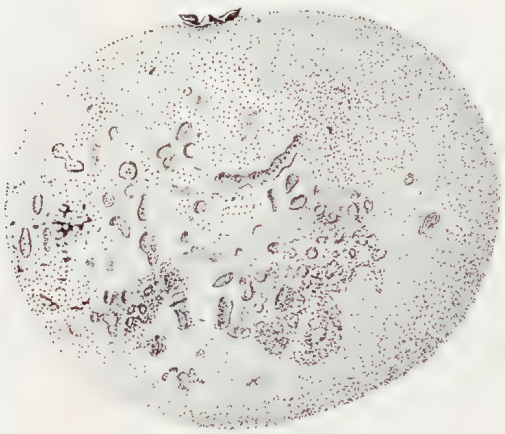

Fig 1

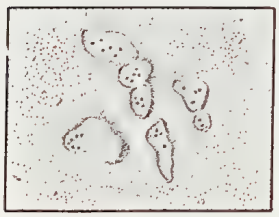

Fig 2.

W. Helmsing 1928.

Plate 50.

Fig. 1, Black Spot on Orange. Fig. 2. Individual spots enlarged to show the black points of the pycnidia.

Spotted fruit becomes more easily attacked by blue mould and other rot-producing fungi, with the result that the keeping qualities are further impaired.

In the orchard it will be found that fruit affected with black spot will not hang on the tree when ripe. The loss from fruit falling off on this account is often considerable.

### Control.

1. It is very noticeable that black spot is often present to a greater extent in an old orchard or one showing signs of neglect. For this reason steps should be taken by satisfactory manuring and cultivation to get the trees in a state of healthy vigorous growth. All dead and sickly wood should be pruned out.

2. As has been pointed out above, the fruiting bodies of the fungus may develop on fallen fruit, and these should therefore be carefully picked up and destroyed by fire or burying.

3. It is possible to control the disease by spraying with Bordeaux mixture. Experiments are now being conducted to determine for Queensland conditions the most effective times at which to make applications. In the meantime the following schedule is suggested:—

Bordeaux of 4-4-40 strength, or Bordeaux 4-4-40 + 1% of oil emulsion—

(1) As soon as the fruit have set;

(2) About one month to six weeks later;

(3) If black spot has been serious previously, another application just prior to the February rains.

Fruit on the sunny side of the tree is more subject to attack, and special attention should therefore be paid to this region.

## Melanose.

Melanose is a trouble which is of rather frequent occurrence in some older orchards, where it may be of more serious consequence than black spot. The orange, mandarin, and lemon may all be affected.

### Symptoms.

The disease appears on leaves, twigs, and fruit, though it is on the latter that it becomes most conspicuous. The characteristic lesions on the fruit consist of small brown, more or less circular dots scattered over the surface. The individual spots vary in size from minute specks up to about $\frac{1}{50}$ inch in diameter. They appear at first merely as a surface stain, but later become slightly elevated and somewhat fissured diagonally or round the margin so that a melanose-affected fruit is decidedly rough to the touch. The spots may be sparsely scattered or abundant, and are often seen to be arrayed in rings or lines (Plate 51).

When numerous a coalescence may take place so that a more or less continuous superficially fissured area is formed. In this latter condition melanose resembles to a certain extent both "Maori" and exanthema. A typical "Maori" orange, however, is usually of more uniform colouration, and is smooth to the touch, while a fruit affected with Exanthema, although rough usually, has the rind of the affected region more definitely hardened often with resultant splitting.

The spotting on the leaves resembles in general appearance that on the fruit except that it is black rather than brown in colour. Leaves badly affected may be puckered and otherwise deformed by the presence of the disease. Young twigs and water-shoots may be attacked in a similar manner, and if infection is severe leaf-fall may result.

Examined microscopically, the lesions are seen to consist of two or three layers of brown dead cells, which in the later stages become elevated by the development of a layer of corky tissue beneath. The unequal tensions resulting from the hardening of the surface layers, and growth of the tissue surrounding, results in the fissuring mentioned above.

## Cause.

The symptoms displayed by this disease are the same as those of the melanose of Florida, which has been shown to be caused by the fungus *Phomopsis citri*. A fungus closely resembling this has been isolated from a stem-end rot of lemons and from dead twigs in Queensland, and it is probable that the two diseases are identical.

Some growers have been in the habit of designating the disease as "false" melanose. This name was applied by McAlpine many years ago to a similar disease then occurring in New South Wales, whose presence he attributed to an entirely different fungus. The term "false" should be avoided when speaking of the disease which occurs in Queensland, since it often leads to confusion.

The fungus *Phomopsis citri* is not a very active parasite, and the melanose lesions formed by it are usually greatly restricted in extent, the fungus itself quickly losing its activity. It does, however, maintain a more active existence on dead twigs and branches, and it is here that the fruiting bodies are produced. These take the form of small depressed flask-like receptacles or pycnidia developed just below the surface of the bark, where they form minute pimple-like pustules the apex of which becomes split to liberate the spores developed within (Plate 51).

The spores are small, clear, oval cells which are extruded in a mass during damp weather. They are then washed by rain and dew from the dead twigs on to young and tender shoots or fruit, where they germinate if conditions are suitable, and infect the living tissue sufficiently to cause the spotting described above. The ring-like arrangement of the spots so characteristic of melanose is due to the lodgment of a number of spores in a water-drop, when they tend to spread out to the margin and there come to rest.

Examination of a tree badly affected with melanose will almost invariably reveal the presence of dead wood. A vigorously growing tree free from dieback is seldom affected. For this reason it is usually the older or neglected orchards that suffer most. It is only young shoots and fruit which are susceptible to infection. Growth which has hardened off is immune. Rain is necessary for the spread of the disease and the germination of the spores. This is always liable to occur in sufficient quantity during the spring and early summer months.

## Control.

To control melanose the object is to reduce as far as possible the source of infection and to keep the young growth covered with a fungicide during its susceptible period.

1. Prune out all dead twigs and branches, and practise a system of fertilising and good cultivation with a view to inducing strong vigorous growth.

Plate 51.—Typical Melanose symptoms on leaf and fruit of the Orange. Also dead twig bearing pycnidia of *Phomopsis citri*.

2. Spray with Bordeaux mixture of 4-4-40 strength, or Bordeaux 4-4-40 + 1% oil emulsion—

(*a*) Immediately the fruit has set;

(*b*) One month to six weeks later, or oftener if the weather conditions are exceptionally wet.

## Scab.

Scab is a disease to which lemons are more particularly subject, their leaves, young twigs, and fruit being affected. During wet seasons most varieties of mandarin may also be attacked, though in this case the foliage may suffer to a greater extent than the fruit. The sweet orange is apparently immune.

### Symptoms.

Only young growth is liable to infection. When the leaves commence to harden off and the fruit to mature they become resistant. The disease appears first on the young soft foliage as small, scattered, light yellowish green spots with a somewhat diffuse margin. The affected area becomes depressed from above downwards or *vice versa* so that a small conical projection is formed on the lower or upper surface of the leaf. At the apex of this elevation a small mass of brown corky tissue is developed which gives the characteristic scabby appearance to the leaf. The corky excrescences are also commonly formed on the leaf surface without previous leaf indentation. They vary in size from minute brown specks to rough wart-like scabs $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter. Large scabby areas may be produced from these by coalescence. Distortion and stunting often result owing to the inability of the leaf affected with scab to develop evenly (Plate 52). The lesions on the twigs and on mandarin fruit resemble in the main those on the leaf. On the lemon fruit the actual scabs are of much the same appearance except that they are as a rule somewhat larger. The effect is, however, often accentuated by the growth of the rind tissue surrounding a scab lesion into a prominent conical projection bearing the scab at its apex. Considerable malformation is produced by this means.

Scab is due to the presence of a fungus (*Sporotrichum citri*) whose fruiting stage appears as a delicate greyish mould covering the surface of young scabs.

### Control.

As pointed out above, the scab fungus infects only young immature tissue. Certain conditions of temperature and moisture are also necessary for its development. These conditions are always liable to occur in the Queensland spring weather, and if scab is present in the orchard steps should be taken to control it by means of spraying. The following applications may be made for this purpose:—

(1) Spray with Bordeaux mixture of 6-4-40 strength, or Bordeaux (6-4-40) + 1% oil emulsion, immediately before the new growth commences. This will help to clean up the fungus present on old scabs.

(2) Bordeaux of 4-4-40 strength, or Bordeaux (4-4-40) + 1% oil emulsion, at about the middle of the flowering period. This and the subsequent application are for the protection of young foliage and fruit.

Plate 52.—Mandarin affected with Scab.

(3) Bordeaux again as soon as the fruit have set.

(4) If the season is exceptionally wet it is advisable to give one or two further applications in order to keep the young fruit and foliage well covered.

It must be remembered that Bordeaux mixture may check the development of entomogenous fungi which materially aid in keeping down scale. It will therefore be necessary to pay particular attention to the control of these pests after Bordeaux has been used. If scab infestation is not serious or if the season is dry, lime sulphur, which does not possess these disadvantages to the same extent, may be substituted.

## Blue Mould.

Blue mould rot of citrus fruits is caused by two allied fungi—*Penicillium digitatum* which forms an olive-green powdery spore coat over rotting fruit, and *Penicillium italicum* in which the spore mass is distinctly blue. The former is by far the chief source of rot in Queensland, and has been known to cause loss of 30 per cent. and over in long-distance consignments. This mould is sometimes referred to as the green mould to distinguish it from the blue form, but since remarks concerning the one are in general applicable to the other they will for convenience be treated together.

### Symptoms.

The rot commences as a small, soft, water-soaked spot on the rind. The area enlarges, and when it has reached about an inch in diameter a white mould develops on the surface and extends out in pace with the softening of the rind by the fungus within the tissue. From the white surface mould are produced closely aggregated short upright hyphæ, which branch two or three times near the end. From each of the final branchlets are cut off chains of minute oval spores. It is the colour of these spores in mass which gives the characteristic appearance of the rotted fruit to which the disease owes its name. Finally the fruit may become broken down to a soft watery mass.

### Contributing Causes.

The loss of citrus fruit in transport on account of blue mould rot has exercised the minds of orchardists throughout the world ever since the growing of these fruits began to assume a large commercial scale. The fungi causing the damage and the factors contributing to the development of the rot have been investigated in various countries, and these investigations in almost every case have led to three important conclusions which clearly point the way to the solution of the problem. These are—

(1) The species of *Penicillium* causing blue mould rot are relatively weak parasites and are unable as a general rule to penetrate the skin of a perfectly sound fruit. The blue mould fungus differs from the green in that the fungal threads making up the surface mould of the former may sometimes pass from a rotted to a healthy uninjured fruit with which it is in direct contact in the case. The first infection by means of spores must take place through wounds in the case of both species. It is a common sight to see perfectly sound fruit lying in a pack alongside one covered with green mould, clearly showing the immunity from infection of the uninjured fruit.

(2) The wounds occasioned during picking, carting, and packing serve as centres for infection by the blue mould spores which are present in the air of the orchard and packing house. Examination of twenty-one cases of oranges and mandarins arriving on the Brisbane markets showed that out of the 286 mouldy fruit present there were only 74 (or 25 per cent.) which did not show an obvious injury to account for the mould invasion, and very many of these consisted of fruit too mouldy for a primary cause to be ascertainable. The more common forms of injury were as follows:—Case bruises and cracks arising from poor packing, especially noticeable in connection with mandarins, 27 per cent.; punctures by long stalks, 18 per cent.; scratches and punctures of which the causal agency could not be determined with certainty, 16 per cent. The rest included miscellaneous injuries due to rubbing and pulling the button out, &c.

(3) The trouble can be to a great extent controlled by cleanliness and careful handling of the fruit to avoid bruising or otherwise injuring it.

## Control.

Keeping the above facts in view, the following recommendations can be made for the control of blue mould.

(1) All waste fruit in the orchard and packing house should be collected at frequent intervals and destroyed by burning or burying, as it will otherwise serve for the production of countless millions of mould spores to contaminate the air in which marketable fruit has to lie.

(2) Picking fruit during wet weather should be avoided, as fruit gathered under moist conditions usually shows a much higher incidence of blue mould. Great care should be exercised during picking operations in order to ensure that no injury is given by the clippers, finger nails, &c. The fruit should be cut, not pulled, and long stalks must be avoided as these are a frequent source of injury to other fruit. It may be found advisable in many cases to make a double cut, removing the stalk close back by a second cut when the fruit is held in the hand.

The method of handling during the transference to the packing shed and subsequently should be such as to avoid bruises or mechanical wounds. The collecting boxes should be smooth and the fruit must be placed in them carefully.

(4) Citrus fruit are best allowed to cure for three to seven days before packing, and all those in which rot commences should be removed by frequent inspection. The grader, if used, should be of a style which does not bruise the fruit. Close attention must be paid to the picking over, and all blemished fruit should be discarded. Packing cases should be made of smooth wood, and care must be taken that the fruit are not rubbed against the sides or the pack made too tight, as bruising and cracking often arise from these causes, especially in the case of mandarins.

Wrapping the fruit serves to lessen blue mould loss by reducing the number of case bruises, and by enclosing any mouldy fruit so that the spores are not distributed throughout the case.

(5) Careful carriage of the consignment between packing shed and market is also advisable but not always within the control of the grower.

By giving attention to cleanliness and careful handling the loss due to blue mould may be reduced to an insignificant minimum.

## Exanthema.

This disease is one apparently not dependent on the presence of parasitic organisms for its development, but is rather due to physiological disorders brought about by improper nutrition. Most varieties of citrus are subject to the malady.

### Symptoms.

In the typical cases on young trees, symptoms commence with a flush of young succulent growth the branches of which are sometimes curved at the ends and usually bear abnormally large dark-green leaves. After a time the new growth assumes a slightly yellowish tinge, and there are developed along the branches dark-brown patches of a resinous appearance due to the deposition of a resin-like substance in the cells of the outer layers of bark. Definite longitudinal cracks may be formed from which is extruded the brown resin mass to form a rounded or fissured excrescence. (Plate 53.) Gum pockets having the appearance of a rounded blister may be formed on the succulent growth by the accumulation of the brown gummy secretion in certain spots between the wood and bark, the latter being forced out in the process. Multiple buds and very angular stems are often characters associated with branches exhibiting this disease. The leaves of the affected terminals usually drop, leaving the bare brown branches showing up conspicuously. Later these die back and are invaded by various saprophytic fungi. A dark-brown superficial marking somewhat similar to that occurring on the shoots may be present on the rind of the fruit borne by a diseased tree. These patches often have the appearance of being formed from aggregated spots. The latter are slightly raised and cracked, which makes the affected area rough to the touch. The presence of this fruit discolouration is usually accompanied by a hardening of the skin, with a consequent restriction in growth, which often leads to cracking.

### Contributing Conditions.

Exanthema usually makes its appearance on very light sandy soils lacking in humus, such as are to be found in some of the coastal citrus areas. The use of this type of soil would appear to be one of the main causes of the occurrence of this disease so far as Queensland is concerned. Heavy rainfall followed by a dry spell; poor drainage; and the excessive use of organic nitrogenous manures are factors also stated to favour the development of exanthema.

### Control.

All dead and dying wood should be removed by thorough pruning.

The soil conditions should be improved as far as possible by judicious manuring (avoiding excessive use of organic nitrogen), and by the ploughing in of green crops to better the physical condition and increase the humus content. Artificial drainage should be practised when necessary.

Some growers have obtained benefit from spraying with Bordeaux mixture, the copper sulphate in this case appearing to act largely as a tonic. The bluestone may also be applied by spreading it on the ground round the tree. In this case ¼ to 1 lb. per tree is used, depending on the size of the tree.

PLATE 53.—EXANTHEMA ON ORANGE.

*From a water-colour drawing by I. W. Helmsing.*

## Dieback.

Dieback is a condition which may sometimes be confused with exanthema. It is characterised by the death of twigs and small branches on the outside and more especially on the top of the tree. This trouble differs from Exanthema in the absence of resinous exudation, gum pockets, and multiple buds, and in the fact that the affected branches are usually of stunted rather than of vigorous growth.

Pink pustules of a fungus (*Glœosporium sp.*) are usually scattered over the dying twigs. This fungus commonly attacks only those branches which are in a weak or dying condition owing to the tree having insufficient vigour to support them.

The trouble appears in neglected orchards and on poor land, more especially if a hard impervious subsoil is causing bad drainage.

The treatment should follow the lines of improving the growing conditions of the tree by good cultivation, manuring, and if necessary drainage, when the trouble will be found to disappear.

## Collar Rot.

Collar rot or foot rot is the commonest and the most destructive of the several forms of gumming disease to which citrus trees are subject. Lemon trees or the lemon stock on which other varieties are worked are most susceptible. The mandarin and sweet orange are also sometimes affected.

### Symptoms.

The disease usually occurs at the base of the main trunk, where it appears as a darker, somewhat water-soaked area not very definitely marked off from the surrounding healthy bark. There is usually a puncture or slit towards the centre from which gum-drops have exuded. The bark over the diseased region may be easily lifted, and between this and the wood is found a slimy, clear, gum-like substance. The wood below the diseased bark exhibits a brown discolouration, which, however, does not usually penetrate for more than $\frac{1}{8}$ inch. The margin between this and the healthy tissue is especially distinct and shows as a narrow band of slightly darker brown.

A collar rot of any size will make its presence evident by a yellowing of the foliage and dieback. This will often take place only on the one or more branches which arise from the same side of the trunk as is affected by the rot. Eventually the branch may die out completely. Should the lesion extend round the trunk the whole tree may be ringbarked and die.

### Cause.

The organism recorded as causing foot rot in Queensland is a fungus known as *Fusarium limonis*. It is, however, probable that other fungi are at times responsible for the trouble.

### Control.

The organisms concerned in collar rot will not penetrate healthy living bark, so that a wound of some form must be present before infection can take place. It is therefore important to avoid any injury during cultivation.

Badly drained soil and water accumulation round the crown are conducive to gumming and should therefore be avoided.

A close watch should be kept for the appearance of collar rot lesions. When caught before they have advanced too far the disease can be cured by surgical methods. The soil should be opened up away from the crown and main roots so as to expose these to the sun and air. The diseased bark and wood must then be carefully removed by cutting or scraping with a sharp instrument well back into sound tissue. The excised pieces should be carefully collected and burnt. If any of the roots are badly affected they are best removed entirely. When the trunk has been thoroughly cleaned of all diseased tissue the wound should be painted with Bordeaux paste.

### Armillaria Root Rot.

The tree affected by this disease exhibits symptoms similar to those associated with collar rot. There is usually a yellowing of the foliage of the whole tree or on one or more branches, together with more or less dieback. As the fungus responsible for this rot attacks also a number of other fruit-trees, the full description of the disease, together with recommendations for treatment, have been left to Chapter XIII.

### Fumagine or Sooty Mould.

Sooty mould cannot be considered as a definite disease to the same extent as may the citrus troubles previously described, but since it is of conspicuous appearance and to a certain extent detrimental to the tree affected a short description is here given.

#### Symptoms.

The tree affected with fumagine is conspicuous on account of the black sooty deposit covering the foliage and often the fruit. It is common to see whole trees or even entire orchards exhibiting the dirty black appearance due to the presence of this mould. The fruit may be rendered so unsightly that scrubbing becomes necessary.

#### Cause.

An examination of the leaves will show the sooty appearance to be due to a thin, black, superficial film, which may be easily scraped off in flakes. This film is formed by the close interlacing of the dark mycelial filaments of a fungus known as *Capnodium citricolum*. This fungus is not a plant parasite, but lives on the sugary substances which become scattered over the leaves after secretion by certain scale insects. Of these latter the chief ones concerned are the pink and white wax scales and to a certain extent the Lecanium or soft scales.

The fungus is entirely superficial in its growth and therefore does not directly injure the tree. The presence of the covering of mould will, however, eventually tend to weaken the tree, as assimilation will be checked by the exclusion of light and by the blocking up of the breathing pores of the leaf.

#### Control.

To get rid of sooty mould it is necessary to destroy the scale insects on whose secretion the fungus is dependent for its existence. This should be done by suitable spraying or cyaniding, when the fumagine will be found to gradually disappear. If it is desired to remove the mould quickly after the destruction of the scale, the trees may be sprayed with a thin paste made by boiling flour in water. This will form a skin over the leaf which when it dries will flake off and carry away the mould in the process.

# NOTES ON SOME POT EXPERIMENTS CARRIED OUT ON THE ABNORMAL SOIL PATCHES—ATHERTON TABLELAND.

By W. R. WINKS, B.Sc., A.A.C.I.

IT has been recorded for some time that the maize grown on certain scrub soils of the Atherton Tableland, particularly around Kairi, exhibits a patchiness of growth, some being quite normal and producing average crops, while in other cases small areas appear which are stunted and fail to produce any cob at all.

The writer's visit to the Tableland was during the planting season, and already this abnormality could be seen in the maize plants 9 inches to 1 foot high, the abnormal plants being yellow and red in colour and much smaller than other plants of the same age.

There appeared to be no regular distribution of these patches, which, over a given area, may amount to 25 per cent. of the total area.

Information obtained from farmers shows that these patches increase every year, not by the appearance of new patches, but by the ones already in existence growing on themselves.

It was, however, not possible for the writer to confirm this method of increase himself, due to the short time at his disposal, but the existence of the abnormality was, at the time of his visit, sufficiently serious to warrant further investigation with a view to its eradication.

The appearance of these patches in the field affords few clues as to why they appear. A white ashy material generally present on these patches seems to point to a destruction of the organic material of the soil, due to burning off of the scrub timbers, but further investigation fails to confirm this view.

This ashy material is not assimilated by the soil even after years of ploughing, but it is probable that the toxic material existing in it may be accumulated just above the hardpan, which is present at a depth of from 5 to 6 inches below both the good and bad soils.

On other parts of the Tableland large areas of newly burnt land growing quite normal maize could be observed, much of the maize growing in beds of ashes and appearing to suffer no ill effects from the ashes. It is also generally stated that this abnormality does not appear on new land until at least the third planting.

As field investigation did not denote very much to account for the poor condition of the maize, a large amount of the abnormal soil was procured to a depth of 4 inches, from the farm of Mr. J. Hooper, of Kairi, and some normal soil from within a few feet of this abnormal soil was also procured for pot experiments.

Analyses of the two soils (supplied herewith) showed little variation, except in the case of lime, the bad soil containing nearly three times as much lime as the good soil, much of this being in the form of carbonate, while the good soil contained no carbonate.

It would appear, therefore, that the abnormality was due, in some part, to excessive lime, and pot experiments were arranged to seek a remedy. Maize is a comparatively cheap crop, and any treatment recommended must, of necessity, be one that is comparatively cheap.

## The Pot Trials.

For the experiment, pots 5 inches in depth and containing 2 lb. of soil were used. The condition of the optimum moisture was determined by the addition of varying amounts of water to the soil, till it came to a state which appeared to be the best moisture condition for plant growth—in this case 25 per cent.—and the soils were kept in this condition during the greater part of their growth, being weighed every day, and the amount of water used by the plant and lost by evaporation added.

Two seeds were planted in each pot, the pots being numbered, and the treatment for each pot being drawn from a hat. After planting the pots were mixed up haphazardly so that the personal factor did not enter into the observations.

In the early part of the experiment mice destroyed many of the seeds, but after a cover had been made by Mr. Cree this trouble was overcome, but it was found necessary to cover the plants at night so that outside moisture could not get into the pots, and this prevented them getting much of the early morning sun, and in the week-ends they were covered for more than a day and a-half.

The amount of fertiliser added was worked out on a drill basis, that is on the basis that the fertiliser would be planted in a drill 6 inches wide, each drill 3 ft. 6 inches apart, and that it would operate to a depth of 4 inches. On this basis one-eighth part of the field would be covered with fertiliser.

Plate 54.

No. 1.—Bad soil fertilised with a complete fertiliser, consisting of 1 cwt. nitrate of soda, 1 cwt. sulphate of potash, 180 lb. superphosphate, and 5 cwt. of gypsum per acre. The second plant in this series was checked by ammonia fumes.

No. 2.—Normal soil unfertilised.

No. 3.—Bad soil unfertilised. Note the secondary roots sent out to support the plant due to its primary root system being insufficient for this purpose.

Plate 55.

No. 4.—Bad soil fertilised with 1 cwt. sulphate of ammonia per acre.
No. 5.—Bad soil fertilised with 1 cwt. nitrate of soda per acre.

While there is much to be said against this reasoning as to the application of fertilisers, the amounts added on a broadcast basis to a 2-lb pot at the rate of 1 cwt. to the acre would be so small as to be almost impossible of mixing with the soil.

Even at this rate a soil of specific gravity 1.27, at the rate of 1 cwt. to the acre, gives on a drill basis only .702 grammes to a 2-lb. pot, or about one-fortieth of an ounce.

Four pots were allotted to each treatment, and four controls each of normal and abnormal soil unfertilised were used as a check on the experiment.

The treatments used were as follows:—

| | |
|---|---|
| Sulphur | 1 cwt. per acre. |
| Sulphate of potash | 1 cwt. per acre. |
| Nitrate of soda | 1 cwt. per acre. |
| Sulphate of ammonia | 1 cwt. per acre. |
| Gypsum | 5 cwt. per acre. |
| Gypsum | 10 cwt. per acre. |
| Superphosphate | 180 lb. per acre. |
| Superphosphate | 3 cwt. per acre. |
| Complete fertiliser | 1 cwt. nitrate of soda,<br>1 cwt. potash,<br>180 lb. superphosphate,<br>5 cwt. gypsum (on broadcast basis). |

One pot each in the above experiments was watered with distilled water, but during the progress of the experiments these pots (which were kept together for the convenience of watering) had ammonia fumes blown over them, burning their leaves and checking their growth to a great extent. Two of the pots containing complete fertiliser were also subjected to a similar calamity.

In the experiments a mistake was made in adding the gypsum on a drill basis, as it was originally intended to be used on a broadcast basis, but this was a rather fortunate error as will be demonstrated later. In the complete fertiliser the gypsum was added on a broadcast basis.

The experiments were commenced on 7th January, 1929, and on 12th January the plants were sufficiently advanced to allow of one being removed from each pot, leaving one plant to the pot in each case. The plants were dug up and their roots examined on 22nd March, 1929, and photographed, 23rd March, 1929.

**Results.**

The results of this experiment served to show quite definitely that the abnormal soils were unfit for maize growth. In every case the plants were thin and spindly with very little root system, which in most cases had been too weak to support them, and hence they were blown over and had sent out secondary stem roots. This is well exemplified in fig. 3 in Plate (54).

The maize in the normal soil was strong and healthy and had good root growth, and, in fact, was little different from the best of the treated pots (Plate (54), fig. 2).

The best growth of all was made by one plant of the completely fertilised pot, but this result is not conclusive as the other three plants were spoilt by ammonia fumes (Plate (54), fig. 1).

The pots treated with 5 cwt. of gypsum and 1 cwt. of sulphur showed little or no response to this treatment, being only slightly above the average of the bad soil controls unfertilised, as will be shown in Plate (56). Little response was shown to potash, which is to be expected from the fact that analysis shows the soils to contain an abundance of available potash (Plate (57)).

A treatment with 10 cwt. of gypsum gave a decided response, but as this was on a drill basis and not a broadcast basis, such treatment would be too expensive to adopt on a cheap crop (Plate (56)).

As the soil is deficient in available phosphoric acid, this wats used in the form of superphosphate, at the rate of 180 lb. per acre and 3 cwt. per acre, the lesser amount showing better results than the greater, which is in accordance with experimental results on the Tableland (Plate (57)).

Very noticeable results were shown by the ammonium sulphate and nitrate of soda treatments. In both cases the maize grew larger and better than in any of the check pots, the better growth being given by ammonium sulphate (Plate (55)).

This would almost be expected as sulphate of ammonia is an acid fertiliser and would tend to bring the soil to a slightly acid or neutral condition, thus overcoming the excess alkalinity.

Plate 56.

No. 6.—Bad soil fertilised with 10 cwt. of gypsum per acre, in drills.
No. 7.—Bad soil fertilised with 5 cwt. of gypsum per acre, in drills.
No. 8.—Bad soil fertilised with 1 cwt. per acre of sulphur.

Plate 57.

No. 9.—Bad soil fertilised with 3 cwt. superphosphate per acre.
No 10.—Bad soil fertilised with 180 lb. superphosphate per acre.
No. 11.—Bad soil fertilised with 1 cwt. sulphate of potash per acre.

**Summary.**

The experiments, while not being conclusive in showing the best fertiliser for use in the district, show that decidedly abnormal conditions exist in the Atherton scrub soils.

These conditions can probably be overcome and the soil brought back to normal by treatment with fertilisers, the best and most suitable of which appears from these experiments, to be sulphate of ammonia.

The good soils were not subjected to any fertiliser treatment, but treatment of the bad soils did not improve them beyond the normal soils, but merely brought them to the normal condition.

A suggested field treatment would be for a field officer to carefully map out certain of these bad patches and to treat them with (1) nitrate of soda, 1 cwt. per acre; (2) ammonium sulphate, 1 cwt. per acre; (3) superphosphate, 180 lb. per acre; and a complete fertiliser consisting of (4) ammonium sulphate, 1 cwt. per acre; superphosphate, 180 lb. per acre; sulphate of potash, 1 cwt. per acre; allowing, say, four drills for each treatment.

This could be carried out with comparatively little expense, and would serve as a check on the laboratory experimental work, though, in the opinion of the writer, much could be done by putting the land under grass or lucerne for two or three years and allowing it to rest from the continuous cropping without rotation to which it has been subjected in past years.

Subsoiling of these patches would also be advisable, but it should be carried out in such a way that the subsoil is broken but not brought to the surface.

Analysis of Atherton Soils used in Pot Experiments.

| — | Ashy Material. | | Bad Soil. | | Good Soil. | |
|---|---|---|---|---|---|---|
| Laboratory No. | .. | | 3021 | | 3022 | |
| Classification | Br. Loam | | Choc. Loam | | Choc. Loam | |
| Reaction (Truog Acidity) | Nil. | | Nil. | | Very slight | |
| Apparent Spc. Grav. | 1·23 | | 1·27 | | 1·20 | |
| Weight of soil in tons per acre 12 in. deep | 1493 | | 1542 | | 1457 | |
| Water Capacity | 54% | | 50% | | 58% | |
| Weight absorbed tons per acre | 806 | | 771 | | 845 | |
| Capillarity after 3, 6, 24, and 48 hours | 7, 10, 16, 21 | | $14\frac{3}{4}$, $18\frac{1}{4}$, $23\frac{3}{4}$, $25\frac{1}{4}$ | | $10\frac{1}{4}$, $13\frac{1}{4}$, $17\frac{3}{4}$, 21 | |
| Moisture | 3·36 lb. per ac. | | 8·70 lb. per ac. | | 5·30 lb. per ac. | |
| Humus | 1·81 4 in. deep | | 1·86 4 in. deep | | 1·95 4 in. deep | |
| Other organic material and combined moisture | 15·53 | | 12·88 | | 13·19 | |
| Chlorine | ·004 | | ·007 | | ·010 | |
| Nitrogen | ·238 | 2565 | ·227 | 2383 | ·254 | 2621 |
| Soluble in Hydrochloric acid of specific gravity— | | | | | | |
| Phosphoric acid $P_2O_5$ | ·38 | 4126 | ·41 | 4260 | ·38 | 3916 |
| Iron, alumina, &c. $Fe_2O_3$, $Al_2O_3$. | 35·02 | | 39·52 | | 39·92 | |
| Lime CaO | 6·71 | 72233 | 2·08 | 21870 | ·88 | 9028 |
| Magnesia MgO | ·86 | | 1·16 | | ·49 | |
| Potash $K_2O$ | ·09 | 1003 | ·11 | 1151 | ·13 | 1305 |
| Insoluble Residue | 39·37 | | 41·68 | | 43·26 | |
| Soluble in 1 per cent. Citric Acid Solution— | | | | | | |
| Phosphoric acid $P_2O_5$ | ·0003 | 3 | ·0008 | 8 | ·0008 | 8 |
| Lime CaO | ·7933 | 8560 | ·8865 | 9315 | ·3690 | 3798 |
| Magnesia MgO | ·0999 | | ·2519 | | ·2356 | |
| Potash $K_2O$ | ·0205 | 221 | ·0141 | 148 | ·0284 | 293 |
| | A | | B | | C | |

A—Agricultural analysis of ashy material mixed with soil.
B—Agricultural analysis of abnormal soil.
C—Agricultural analysis of normal soil.

Analysis of Ashy Material in Soil.

Lab. 2280.

| | Per cent. |
|---|---|
| Moisture | 2.56 |
| Loss on ignition | 16.32 |
| Silica | 34.03 |
| Potash | .26 |
| Lime | 14.14 |
| Magnesia | 1.60 |
| Phosphoric acid | .47 |
| Iron and alumina | 31.40 |

Analysis of Ash of Maize Plants.

| Moisture. | On air-dried material. | Calculated to dry weight. |
|---|---|---|
| | Per cent. | Per cent. |
| Ash | 10.80 | 11.30 |
| Phosphoric acid | 5.16 | 5.32 |
| Iron | 4.60 | 4.81 |
| Alumina | 9.44 | 9.90 |
| Lime | 5.32 | 5.57 |

## INDEX TO PLATES.

Plate (54).

Fig. 1.—Bad soil fertilised with a complete fertiliser consisting of 1 cwt. nitrate of soda, 1 cwt. sulphate of potash, 180 lb. superphosphate, and 5 cwt. of gypsum per acre. The gypsum was added on a broadcast basis calculated as 5 cwt. per acre, 4 inches deep. The second plant in this series was checked by ammonia fumes.

Fig. 2.—Normal soil unfertilised.

Fig. 3.—Abnormal soil unfertilised. Note the secondary roots sent out from the cornstalk to support the plant, due to its primary root system being insufficient for this purpose.

Plate (55).

Fig. 4.—Bad soil fertilised with 1 cwt. sulphate of ammonia per acre.

Fig. 5.—Bad soil fertilised with 1 cwt. nitrate of soda per acre.

Plate (56).

Fig. 6.—Bad soil fertilised with 10 cwt. of gypsum per acre in drills.

Fig. 7.—Bad soil fertilised with 5 cwt. of gypsum per acre in drills.

Fig. 8.—Bad soil fertilised with 1 cwt. of sulphur per acre.

Plate (57).

Fig. 9.—Bad soil fertilised with 3 cwt. superphosphate per acre.

Fig. 10.—Bad soil fertilised with 180 lb. superphosphate per acre.

Fig. 11.—Bad soil fertilised with 1 cwt. sulphate of potash per acre.

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# AGRICULTURE IN QUEENSLAND.

## QUARTERLY CROP REPORT.

The Minister for Agriculture, Hon. Harry F. Walker, has received the following reports from Messrs. A. E. Gibson, G. B. Brooks, and N. A. R. Pollock, Senior Instructors in Agriculture for the Southern, Central, and Northern Districts respectively.

### SOUTHERN QUEENSLAND.

Although the rainfall experienced during the month of April was ample for agricultural and dairying requirements, the subsequent dry stretch extending from the beginning of May until well on towards the end of June had a counteracting effect and delayed wheat-planting, and also affected the dairying industry. Pastures have in all cases been reported upon as being ample for requirements, the dry, cold weather, accompanied in most instances by frost, has been responsible for a rapid drying off of all grass and herbage. Water supplies are in all instances adequate and sufficient for immediate requirements. Live stock in every instance are in good condition and markets are generally firm.

Although a considerable area of wheat had been sown with late maturing varieties early in April, as previously mentioned the lack of sufficient moisture delayed sowing, but with the advent of good rains in the latter part of June a considerable area has since been planted and sowing is now practically completed. A few areas which missed a sufficiency of rainfall will probably now lie fallow until the maize-planting season. It is expected that the area under wheat this year will approximately equal that of 1928.

Maize harvesting is approaching completion, and, whilst on the whole the crop may be regarded as satisfactory, certain areas report a medium harvest only. The area under crop is comparable with that of 1928.

Although the recent dry and cold weather experienced throughout the Downs has affected the growth of lucerne, good cuttings were being obtained before the frost. No general increase in the area under this crop is reported, although certain districts claim a slight improvement.

Fodder crops, including oats, barley, and in some instances late sorghums, are generally reported as good and show an increase in some districts in the acreages under oats for green fodder, particularly so in the coastal areas. Malting barley, owing to existing conditions, is below the average area sown on the Downs.

Pumpkins have given satisfactory yields in many districts, while in others crops have been light. Potatoes both English and sweet are expected to give satisfactory yields, and in some districts the area under these crops has increased. Harvesting of the crop is already completed in some districts, heavy yields being obtained. Root crops apart from potatoes, while giving in many instances satisfactory returns, do not appear to be favoured outside the immediate coastal areas, and even in these a decrease in area is reported.

Arrowroot crops are reported to be satisfactory, but a decline in the area under this crop is noted.

Heavy rain in the early part of the quarter under review was the cause of a fair amount of damage to lucerne crops harvested for hay, particularly so in the coastal areas; later cuttings have, however, been satisfactory.

Inland and above the Range the quality of the hay conserved has generally been high. On the black soil areas cultivation has, to a certain extent, been delayed by lack of soil moisture. On the lighter classes of soil field operations for summer crops are well advanced.

### CENTRAL QUEENSLAND.

The rainfall received in the Central area during April ranged from 8.98 in. at Rockhampton to 2.86 in. at Jambin in the Callide Valley. May was remarkable for its dryness, no rainfall being registered during that month. The falls recorded in June compensated for the previous month's dryness, ranging from 10.39 at Rockhampton to 2.21 at Jambin.

Light frosts were experienced along the coast including Mackay, and heavy frosts recorded in the Dawson and Callide areas. Low temperatures were experienced earlier than usual, four frosts being recorded in the Callide during April. May was responsible for eight frosts, and nine were recorded in June. Early frosts were responsible for some damage to cotton and other crops.

Grass and water are plentiful in the various localities embracing Mackay and Bundaberg on the coast, and Durango, Dawson and Callide Valleys, and Theodore to the west.

Although a few isolated cases of pleuro and blackleg have been reported, stock generally are healthy and in good condition. All classes of stock have been realising satisfactory prices and a keen demand exists for stores. Draught horses are fetching remarkably good prices in the Mackay district.

The area under wheat is estimated to be double that of last season. Incidentally, increased area of peanuts, sorghums, pumpkins, lucerne, and rape have been noted, whilst more attention is being given to the growing of winter cereals for dairy fodder purposes. The area harvested for potatoes, both English and sweet, shows a decrease compared with last season, for which floods in the early part of the year were mainly responsible.

Hay crops are mostly confined to panicums, millets, and sudan grass; these were generally secured in good condition. Many farmers in the Central district rely on stand-over crops of sorghum to carry their stock through the winter months.

It is estimated that approximately 800 tons of silage have been conserved during the last three months.

An excellent germination was secured from the first planting of wheat, and the recent rains will ensure later sowings germinating satisfactorily. Land upon which cotton and maize were grown is in the course of preparation for spring crops. Conditions generally are excellent for the preparation of good seed-beds.

Reviewing climatic conditions of the period under review, it may be considered that although on the whole they could be classed as good, they were at the same time erratic. Heavy falls of rain occurred during April and June, whilst over the whole area no rain fell in May. June registrations constituted a record for Rockhampton and surrounding districts. While there is an abundance of grass, no succulence is present in the dairy pastures, but recent rains are having the effect of promoting growths of herbage, and, owing to the fact that many farmers have sown areas of wheat, barley, or oats for winter feed, these are making excellent growth. The outlook for the ensuing three months is most promising.

## NORTHERN QUEENSLAND.

Although the rainfall experienced during April in the northern portion of the State was above the average, May was almost rainless, while the precipitations recorded in June were also above the average. Pastures were stated to be excellent, though in lightly stocked localities much of the grass produced a rank growth.

Stock generally are in good condition, although it is admitted that most of the fats arriving at the meatworks could show an improvement in condition. The small flocks of sheep at Hervey's Range and on the Tableland are particularly mentioned as being in very good order.

Due to drought losses in previous seasons supplies of fat cattle are not heavy. Meatworks killings will probably be in the vicinity of 80,000 head, and it is anticipated that the average dressed weights of these will range between 650 to 700 lb. Present price, delivered at the works, is 25s. per 100 lb. for first quality, whilst retail butchers are paying a little more. A strong demand exists for store cattle, but very few are changing hands. The outlook for the cattle market generally is very bright.

The supply of pigs to the Tableland's bacon factory at Mareeba is steadily increasing.

While it is expected that the area under maize and peanuts is likely to decrease, increased areas are to be noted in broom millet, arrowroot, potatoes, tobacco, and all classes of fodder crops. The maize crop is now being harvested and is nearing completion, only a medium crop being anticipated. Late reports of harvesting operations on the Atherton Tableland point to a possible shortage of 7,000 tons compared with last season's figures.

Tableland hay has been harvested under adverse conditions and quality in consequence suffered, and can only be classed as useful for home consumption. In other localities, where conditions were more favourable, the quality is reported as very fair. No stack silage has been conserved, but the quantity conserved in pits and silos equals that of last season.

No appreciable area of land is as yet being prepared for cropping, except where crops are to be grown by the aid of irrigation. Ploughing usually commences in the months of September and October, when all the crops have been harvested. Generally speaking, the season has been favourable and prices realised for agricultural produce satisfactory.

The fine falls of rain experienced during June are expected to ensure satisfactory yields from truck crops as well as green fodders for dairy cattle. The area under the latter shows a gratifying increase, it being estimated that fully 600 acres on the Tableland are under barley, oats, and wheat for this purpose.

Cream supplies to the factories at Malanda, Ravenshoe, and Julatten are very satisfactory, and that dairying prospects for the next months are excellent, due to the fine rainfall that the Tableland has experienced, which is responsible for heavy growth of winter fodders that later on will mean increased supplies of cream to the factories.

Plate 58.—A Prolific Papaw Tree.

Grown by Mr. T. M. Evans within a coo-ee of the Brisbane Town Hall. There are over 200 fruits on this two-year old tree and still more are forming.

## QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Scrub Bloodwood (*Baloghia lucida*) is one of the smaller rain-forest trees, as it does not exceed about 1 ft. in stem diameter and about 90 ft. in height. The bark is very frequently marked by dark patches or spots of hardened gum. When cut the bark exudes a bright red sap which accounts for the common name of Scrub Bloodwood. The species extends from Illawarra, New South Wales (Bentham) to Rockingham Bay, North Queensland. It is found also on Lord Howe and Norfolk Islands and in New Caledonia.

*Photo.: W. D. Francis.*

PLATE 59.

SCRUB BLOODWOOD *(Baloghia lucida)*, A TREE IN THE IMBIL RAIN FOREST.

*Photo.: Dept. of Agriculture and Stock.]*

PLATE 60.—SCRUB BLOODWOOD (*Baloghia lucida*).

A. Flower-bearing twig; B. Dry fruit; C. Part of dry fruit; D. Same as C, but with outer covering removed; E. Seed.

# RETIREMENT OF MR. HENRY TRYON.

## VALEDICTORY GATHERING.

The retirement of Mr. Henry Tryon, formerly Government Entomologist and Vegetable Pathologist, from the Public Service of Queensland on 29th June was marked by a large valedictory gathering at the Department of Agriculture and Stock on the following Monday afternoon.

Mr. E. Graham (Under Secretary), who presided, said that the function had been arranged for the purpose of bidding an official farewell to Mr. Tryon, who had been associated with the Public Service of the State for nearly half a century. For the greater part of that time he had held a very important post in the Department as Government Entomologist. As a result of his work Queensland had greatly benefited, particularly in respect to the great primary industries of the State. In the course of his forty-six years of service he had been of great assistance to the Department of Agriculture and Stock, helping it, advising it, and controlling its entomological and pathological activities. His work had been extensive, and he had been responsible for much of the important pioneering work of Australia in his chosen scientific field. His services to the sugar industry particularly had been of immense value. As a result of a visit paid by him to New Guinea on a Government mission in 1896, new varieties of cane had been introduced into Queensland, including the variety known as Badila, which had proved of vast economic advantage to Queensland sugar-growers. Mr. Tryon's record was a splendid one of service to the State, and it was the hope and wish of his fellow officers of the Department, who had such a high appreciation of his work and worth, that he would enjoy a well-earned leisure; and they would all retain pleasant recollections of their association with him and of the yeoman service he had rendered to Queensland.

Mr. F. F. Coleman and Mr. C. T. White (Government Botanist) supported Mr. Graham's remarks.

Mr. Graham then presented Mr. Tryon with a wallet of bank notes as a token of the high esteem in which he was held by the officers of the Department. He remarked that Mr. Tryon had served under every Minister for Agriculture since that portfolio had been inaugurated.

Mr. White, on behalf of Mr. Hubert Jarvis, then presented Mr. Tryon with an additional serviceable token from the officers of the Department in the Stanthorpe area.

Mr. Tryon, in responding, thanked his former colleagues most heartily for meeting together to wish him god-speed on the occasion of his retirement. He appreciated also the material tokens which he was asked to accept as denotive of their appreciation of associations now severed. Gratitude evaporated, it had been said, on being expressed, and so he would not draw further upon even the ample fountain of it he possessed. However, he continued, a man was known by his friends. What of all that was good must be reflected upon him from them with all the friendliness of those whose personal characters whose mental gifts and whose efficiency went to constitute a departmental staff not excelled by any official administrative staffs in the Australian Commonwealth. Mr. Graham had reminded them that he had served under every Minister of the Department of Agriculture and under every Under Secretary. He had not troubled Ministers, but he was afraid that he could not plead that he had not troubled the permanent heads, however. He remembered one—always most kind to him—the first he was under and most worthy—saying: "Tryon, you have too much devil in you." He spoke with the strong conviction and terseness of a Scotsman, and being a religious man perhaps knew more of the devil than he did. (Laughter.)

### The Ideals of Public Service.

They would expect him as a very old public servant to give them some of his views as to the ideals that should actuate the discharge of one's duties to his Department. To every officer he would say—Study as fully as was possible to work in combination, manifesting combined effort. That was especially needful where science and scientific enterprise were involved. Recently it was his pleasure to hear the Public Service Commissioner, Mr. J. D. Story, urge this consideration in addressing members of the University staff as a matter of supreme importance. Again he would present to them another ideal—perhaps it should have been given priority—aim at some other end than emolument of office and the briefest extent of daily or weekly service; aim to make yourself, he concluded, ever more mentally strengthened, equipped, and efficient for the discharge of your duties—that is what you owe to the public whose servants you are. (Applause.)

Plate 61.—Mr. Henry Tryon,

Formerly Chief Government Entomologist and Vegetable Pathologist, who has retired after nearly half a century of service.

## MR. TRYON'S SCIENTIFIC SERVICES.

Perhaps Mr. Tryon's most material service to Australia was one not directly associated with entomology. In 1895, when the Department, in co-operation with that of New South Wales, decided upon sending a party to New Guinea to secure new varieties of sugar-cane, it entrusted the command of the expedition to Mr. Tryon.

Accordingly, on the 14th September of that year, he left Thursday Island in the 18-ton cutter "P.C.E." for New Guinea, and after exploratory travels in many districts returned to Cooktown in January in the following year with his boat laden with sugar-canes that, together with a previous consignment from him, comprised sixty-five named varieties that he had obtained from many native gardens. Amongst these were the Goru (3) and Badila; and it would be difficult to estimate the immense monetary value they have been to Queensland. Then followed their methodical testing in the field, laboratory and mill, conducted by the Department of Agriculture and Stock and the Colonial Sugar Refining Company.

The mere enumeration of his Reports, often lengthy and detailed, will, it is considered, point to other benefits to the State accuring from his labours and his long years of service.

### A Record of a Busy Life.

Following is a list of Mr. Tryon's scientific writings as contained in the "International Catalogue of Scientific Literature" (Queensland Vol.—J. Shirley B.Sc., 1899), with additions to date:—

ECONOMIC ZOOLOGY, INCLUDING ENTOMOLOGY.

1. Notes on Queensland Ants. Proc. Roy. Soc. Queens., 2, 1885, 146-162. Reprint. 34.
2. The Occurrence of the Genus Apus in Australia. Trans. Nat. Hist. Soc. Queensland, 1, 1893, 64-65.
3. The Bean Maggot. Trans. Nat. Hist. Soc. Queens., 1, 1892, 4-7.
4. Bean and Pea Weevils. Trans. Nat. Hist. Soc. Queensland, 1, 1894, 86-90.
5. List of Butterflies collected in British New Guinea Expeditions undertaken during year 1889-1890. Ann. Rep. Brit. N. Guinea, 1889-1890, 112-115.
6. Scale Insects—Coccidæ. Queens. Agr. Jour., 1, 1897, 118-129. Three plates.
7. List of Coleoptera collected in the St. Joseph River district of B. New Guinea, by Mr. A. C. English. Ann. Rep. Brit. N. Guinea, 1889-1890, 109-112.
8. Cryptolaemus Montrouzieri, or the Scale Insects' Enemy. Trans. Nat. Hist. Soc. Queens., 1, 1892, 23-26.
9. Hemiptera of New Guinea. Annals of the Queens. Mus., Part 2, 13-24. 1892.
10. Hemiptera collected in British New Guinea during 1890-91, under the auspices of His Honour the Administrator. Ann. Rep. on Brit. N. Guinea, 1890-91, 99-104.
11. Destructive Insects Liable of Introduction to Queensland. Queens. Agr. Jour., 1, 1897, 30-40.
12. The Insect Enemies of Cereals belonging to the genus Cecidomyia. Trans. Nat. Hist. Soc. Queens., 1, 1894, 81-83.
13. Insect Friends and Insect Foes (Fruitgrowers' Conf. Brisb. June 1897). Queens. Agr. Jour., 1, 1897, 465-472.
14. Insects as Fungus Hosts. Trans. Nat. Hist. Soc. Queens., 1, 1893, 51-59.
15. Report on Insect (and Fungus) Pest. Parliamentary paper, Brisbane, 1889: 8vo. edition Dep. Agr. Bris. 1889. (Edition 3 Annual Report of Department of Agriculture 1889-1890, Brisbane: Government Printer.) Reviews (1) U.S.A. (2) Canada, &c.
16. Three Undescribed Insects whose food plant is the Moreton Bay Fig, and the Injuries which they Occasion. Trans. Nat. Hist. Soc. Queens., 1, 1893, 60-63.
17. Injurious Marine Animal. Trans. Nat. Hist. Soc. Queens., 1, 1893, 39-45.
18. Judicial Entomology, and an Unrecorded Habit of White Ants. Proc. Roy. Soc. Queens., 4, 1887, 119-123.
19. Errata contained in "A List of the Land Shells recorded from Queensland." Proc. Roy. Soc. Queensland, 5, 1888, 131-137.

20. Orange-piercing Moths—Fam. Ophiderinæ. Queens. Ag. Jour. 2, 1898, 308-315. Plates XVIII.-XXII.

21. The Parasite of the Fruit Maggot. Trans. Nat. Hist. Soc. Queens., 1, 1892, 8-9.

22. On Peripatus and its Occurrence in Australia. Proc. Roy Soc. Queens., 4, 1887, 78-85.

23. Pernicious or San José Scale. Queens. Ag. Jour., 2, June, 1898, 494-510. Plates XL. and XLI.

24. Bulletin No. 4, Second Series. The Disease affecting the Orange Orchards of Wide Bay, and the Insect Pests prevalent therein. Department of Agriculture, October 1894.

25. A New Tobacco Pest (*Lita solanella*). Trans. Nat. Hist. Soc. Queens., 1, 1892, 19-22.

26. The Whistling Moth. Trans. Nat. Hist. Soc. Queens., 1, 1892, 1-3.

27. "Insects" of British New Guinea. By J. P. Thomson, F.R.S.G., &c. Appendix III. *Op. cit.* 222-272. Lond., 1892.

28. Insect Friends and Insect Foes. Report of Proc. of Conference of Australian Fruitgrowers, June 1897, pp. 108-115. Brisbane 1897.

29. "The Diseases affecting the Orange Orchards of the Wide Bay and the Insect Pests present thereon." Bulletin, 4th October, 1894. Department of Agriculture. Brisbane, 1894.

30. The Tobacco Beetle. "Agricultural Gazette" New South Wales, Vol. 1, Pt. 3, pp. 273-277, Dec., 1900.

31. Experiments in "Cyaniding Oranges," Dep. of Agric. Agricultural Journal, Vol. IV., pp. 450-456.

32. Vaginula Slugs, Dep. of Agr. Agr. Journal, Vol. V., pp. 63-70.

33. Caterpillar Plaugue (*Leucania unipuncta* Hawe), Dep. of Agr. Agr. Journal, Vol. VI., pp. 135-147. Feb., 1900. And as separate, Qd. Dep. Agr., 1921, pp. 1-17, Pl. 1-3.

34. Harvesting Ants, Dep. of Agr. Qd. Agr. Journal, Vol. VII., July, 1900, pp. 71-79.

35. The Sweet Potato Weevil (*Cylas turcipennis* Bohm), Dep. of Agr. Qd. Agr. Journal, VII., 176-189.

36. Carpenter Bees, *op. cit.*, 553-554.

37. Pineapple Mealy Bug (*Dactylopius bromeliæ* Bouché), *op. cit.*, 297-298.

38. A Parasite of Sugar Cane Beetle Grubs (*Dieteis formosus* Guerin), Dep. of Ag. Qd. Agr. Journal, Vol. X. (February, 1902.)

39. Entomology (Miscellaneous Notes), Dep. of Agr. 90. Agr. Journal, Vol. X. p. 62-3 (1902).

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45. *Rhopalocera* collected in British New Guinea during 1889-90, under the auspices of His Honour the Administrator. Second Ann. Report of Adm. of B.N. Guinea. Appendix V., pp. 112-115. Brisbane, 1890.

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47. On an Acarus associated with a diseased condition of the Banana. Proc. Roy. Soc. Qd., Vol. IV., 1887.

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51. Rat Parasites (Fleas) and Plague. (Pulicidæ of the Naturalised Rates of Queensland); in Report on Plague in Queensland, 1900-1907, by B. Burnett Ham, M.D., &c. Brisbane, by authority, 1907. *Op. cit.*, pp. 137-160, Pl. III.-VII.

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1. Sea Scum and its Nature. Proc. Roy. Soc. Queens., 2, 1885, 18-24 (7400).

2. Rev. Benedict Scortechini, LL.B., F.L.S., &c., Obituary Notice. Proc. Roy. Soc. Queens., 4, 1887, 2-8.

3. Report on (Insect and) Fungus Pests. Parliamentary Paper, Brisbane, 1889; Government Printer.

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6. Report on Insect and Fungus Pests No. 1, pp. 1-238. Dep. of Agr., Brisbane, 1889.

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*Photo.: Dept. of Public Instruction.*]

PLATE 62.—A LECTURE ON TEETH.

The Travelling Dental Clinic provides a well appreciated service in rural Queensland. Public health is regarded as of the utmost importance, and by this means country school children are taught the elements of dental hygiene, besides receiving qualified dental attention.

# THE CULTIVATION OF THE PEANUT.

By N. A. R. POLLOCK, Northern Instructor in Agriculture.*

## Description.

THE Peanut, "*Arachis hypogœa*," also known frequently as the earth or ground nut, is a plant of annual habit, belonging to the natural order Leguminoseæ or pod-bearers, and in common with most other members of the pea family has the power of obtaining its nitrogen supply from the atmosphere and storing it up in nodules on the roots.

Unlike other legumes, excepting the Bombarra ground nut, "*Voandzeia Subterranea*," this plant, while blooming above ground, matures its pod or fruit under the surface of the soil. The yellow flowers are borne at the joints where the leaves are attached to the stem, in the bunch or upright varieties at the base of the plant, and in creeper or procumbent varieties right along the stems. Upon pollination taking place the flower fades, and falling off leaves the stalk with a thickened pointed end called the "peg" or "point," which grows down into the soil, where it matures into the pod or so-called nut. It is apparent from this that the soil on which the crop is grown should be of a soft or friable nature or such that a loose surface can be easily maintained.

## Range.

The peanut can be grown over the whole of Queensland, and while in the cooler parts it only succeeds in summer, in the tropical portions it may be grown at any period of the year where a sufficiency of rain falls.

The period of growth ranges according to variety and climate from fifteen to twenty weeks, the longest period being taken up by the creeper or procumbent varieties.

A moderate rainfall, plenty of sunshine, and a comparatively high temperature best suit the crop, and departures from these may result in a more lengthened period of growth. The crop can also be grown under irrigation.

## Soils.

The nature of the soil on which the crop is grown, besides its fertility, is the main factor in a prolific crop. A loose texture is desirable to allow the pegs to easily penetrate and expand to form the pods and mature evenly, as well as to permit of easy harvesting in freeing the nuts from the soil. Good drainage is also essential, more especially when a heavy rainfall is liable to occur during the growing period.

Light sandy loams are best adapted for the production of peanuts for market as edible nuts, since the shells are clean and bright. Soils inclined to be clayey are apt to stain the shells, and though the berries or peas may be of equal quality, the clean, bright shell, being more inviting, will naturally command a better price. Ill-drained or sour soils are not desirable. Peanuts may be grown on most soils except a heavy or puggy clay, but except in the loose, friable soils they should only be grown for feeding off.

## Rotation.

Peanuts should always be grown in a rotation, as though owing to the roots being harvested the same quantity of nitrogen is not left in the soil as with other legumes, where the whole root system is available, a sufficient quantity of the nodule-bearing rootlets are left to exert an influence on the following crop. At Tolga, in a comparison with potatoes grown on land on which the previous crops were maize and peanuts, the yield on the portion previously cropped with peanuts was estimated by an official of the Department to be 9 tons of tubers as against 6 tons on that previously cropped with maize. In the rotation, however, the peanut, when harvested, should not take the place of the legume or other crop that is ploughed under to restore the organic matter in the soil, and should only be looked upon as adding a quantity of nitrogen. Where the whole growing plant is ploughed under it answers the same purpose as cowpeas, Mauritius, and velvet beans, &c.

In orchards, either as a crop to be ploughed under or to be harvested, the peanut is commended.

* These notes first appeared in the Journal for June, 1922, and again in the issue for August, 1927, and are now reprinted in response to numerous requests from our readers.—Ed.

**Fertilisers and Lime.**

In common with other legumes, the peanut thrives best in a soil in which there is a sufficiency of lime. Not all soils require the addition of lime, but most soils in districts subject to heavy rainfall, and which give an avid reaction, will benefit by an application of from 5 to 10 cwt. of stone lime or 10 to 20 cwt. of earthy lime or pulverised limestone to the acre, broadcasted (not ploughed in), preferably a week or more before applying commercial fertiliser and sowing the seed. The cultivation of the crop will sufficiently work this lime into the soil. Where any doubt exists as to the necessity of applying lime to the soil, a portion should be limed and the resultant crop compared with a similar area unlimed.

In appying manures for the crop, care should be taken to only apply organic manure in a well rotted condition, and then only in small quantities and thoroughly mixed with the soil. Larger quantities or fresh manures will result in many of the pods being poorly filled. These poorly-filled pods are known as "pops" or "duds."

Organic manures should be applied to a previous crop to get the best results.

As the peanut is a legume and draws nitrogen from the air, this element is not called for in quantity in the fertiliser, but its presence in small quantity, say, 2 per cent. or 3 per cent., will be beneficial. Phosphoric acid and potash will be the chief elements in the fertiliser, and the quantities will be dependent on the soil content. In general, a fertiliser containing from 10 to 12 per cent. phosphoric acid, 2 to 3 per cent. nitrogen, and 6 to 8 per cent. potash will be a good mixture, and may be applied in quantities of from 1 cwt. to 5 cwt. per acre. Such a mixture can be obtained with 1 part sulphate ammonia, 7 parts superphosphate, and 1½ parts sulphate of potash.

The most suitable application will be discovered by applying varying quantities over a small area and noting results, but usually 2 cwt. is sufficient.

Commercial fertilisers are usually applied immediately prior to planting a crop, and as the roots of the peanut do not spread to any distance, the application in the drill with a fertiliser distributor having one or two tines at the back will greatly aid in mixing the fertiliser with the soil.

Ashes from the forest hardwoods, which contain lime and potash, are useful, and may be applied to the soil broadcast in a similar manner to lime at the rate of about 10 cwt. to the acre. These ashes, however, should not previously have been exposed to rain, as then a great deal of their value will have been lost. The ashes of soft woods growing in the scrubs are not considered so good.

**Selection of Seed.**

As with other crops, in order to secure the best results it is essential that the seed of the peanut should be of the highest grade. Poor seed cannot be expected to yield a good return. In the first planting, seed should be secured from a heavy producing crop and subsequently carefully selected in the field from the heaviest producing plant of the required type. A good plan is to select the nuts from the best producing plants and sow these in a special seed patch, each year selecting the best of this area for next year's seed patch. Nuts harvested for seed should be fully matured, handled carefully, and not picked from the plants for several weeks after curing; they should then be picked by hand and the selected ones thoroughly dried and stored in a dry place free from mice or insect attack. Storage in tanks in a similar manner to maize is most satisfactory.

**Methods of Planting.**

The seed can either be planted whole or shelled. Whole nuts may be soaked in cold water twelve to twenty-four hours, drained, dried for an hour or two to assist handling, and then planted. This accelerates germination. Shelled seed should not be soaked.

Where shelled seed is used the shelling should be done by hand, though hand shellers carefully handled are sometimes used. All shelled seed in which the thin skin covering the seed is broken should not be sown, as this injury is liable to affect germination.

Breaking the pods in two answers the same purpose as shelling. Where the seed after planting may be subject to attack by vermin, the seed may be treated by sprinkling with a solution of equal parts of stockholm tar and kerosene. In this case, however, to protect the maturing crop it is advisable to destroy, by poisoning, the vermin beforehand.

Whether planted whole or shelled the operation may be effected by hand or with planters especially designed for the purpose.

Plate 63.—Peanut Growing in the South Burnett.

Top—Ploughing out prior to stacking. Centre—Lifting peanut roots for stacking. Bottom—Stacked.

### Amount of Seed.

The amount of seed required to plant an acre is about 40 lb. of the whole nuts and from 25 to 30 lb. of whole nuts shelled, varying slightly according to the weight of the nut and the distance apart they are planted. Some growers use as much as 60 lb. per acre of the large podded varieties. It is interesting to note that the whole nut, when planted, provides but one plant, but if shelled and the kernels planted apart, two plants will result.

### Time of Sowing.

According to the climates of the various districts, so will the time for planting vary.

In the cooler districts, sowings may be made when all danger of frosts is over and the soil can be expected to be reasonably warm, September, October, November, and December being suitable months. In the tropics the crop can be grown practically throughout the year, but consideration must be given to climate and rainfall—i.e., sufficient rainfall should be obtained to grow the crop and fine weather be expected at harvest time.

In the tropical portions of the State, where the monsoonal rain or wet season commences in December, the main crop is sown in January, February, and March, according to the likelihood of reasonably fine weather in the months of April, May, and June or July, when harvesting should occur.

In planting large areas it is recommended to spread the sowings over such a time as will allow of harvesting one lot before the next is over-ripe. Peanuts left too long in the ground are easily detached from the plant and consequently more difficult to harvest, while some varieties are liable to sprout.

### Length of Crop.

The large nuts or creeper varieties require a longer time for growth to maturity than do the bunch or upright varieties, the time varying from fifteen to seventeen weeks for the bunch varieties and from seventeen to twenty weeks frequently for the creeper variety.

### Preparation of Land.

In preparing the land for peanuts the first ploughing may be deep, but the second should not be deeper than 6 in., preferably 5 in. This top 5 in. should be brought to a fine tilth and be free from weeds and trash.

Where lime or ashes have been applied the land is harrowed and drills drawn out, in which the fertiliser, if any, is mixed and the peanuts sown either by hand or with the planter. The drawing of drills may be done with the fertiliser distributor, or the whole operation can be done with a seed drill and fertiliser distributor combined.

Where no seed drill or fertiliser distributor is obtainable, the drills could be drawn out with a cultivator having a wide shovel attachment in the rear, the fertiliser dusted along this by hand, the cultivator then run along the drill with tines set close in front to mix the fertiliser with the soil, and the shovel attachment set at the back to reopen the drill for the reception of the seed to be dropped by hand; this drill should not be deeper than 4 in. from the levelled surface of the soil, and the seed should be covered to a depth of 2 to 3 in., according to the texture of the soil and its moisture content. In light soils where evaporation is great the deeper planting is preferable, but in stiffer soils the shallower covering should be adopted.

A light firming of the soil over the seed is desirable, and this is obtained in the seed drill by a wheel at the rear. When planted by hand the area may be covered with the harrow, or preferably by the cultivator, with tines straddling the drill and set so as to throw the soil inwards.

### Time of Germination.

Germination usually occurs with shelled nuts in five days, but is subject to the amount of moisture and heat in the soil. The whole nuts take longer unless first soaked in water, as the moisture has to penetrate the shell to affect the berry or pea which contains the germ.

### Spacing.

The intervals between drills and the spacings between seeds in the drills vary somewhat, according to the richness of the soil and the variety planted.

The bunch or upright varieties take up much less room than the creeper or procumbent kinds, and the growth of both is correspondingly greater on the richer soil.

In general, the drills are drawn out from 30 in. to 42 in. apart, the distance being influenced by the space required by the cultivating implement.

The spacing of the seed in the bunch varieties may be from 6 to 12 in. apart, and of the creeper varieties from 12 to 24 in. apart in the drill. An instance of success with close planting is noted from an experiment in width, in a light sandy loam, the bunch varieties were planted 3 in. apart in drills 30 in. wide. It is thought, however, in richer soils this crowding of the plants would be detrimental.

Plate 64.

Top—On a Memerambi Farm—Stacks of "nuts" awaiting transport to the thresher.

Bottom—Topping up the Load—A peanut harvest scene on a Wooroolin farm.

**Cultivation.**

Where close planting has been adopted the land may be harrowed with a light harrow shortly after the plants appear through the surface. Otherwise it will be better to use the cultivator between the rows and the hand hoe, where necessary, between the plants. The first one or two cultivations should be done with fine points, as in the strawberry cultivator or the 1¼-in. or narrowest shovel points supplied with the usual 5-tooth cultivator; after this the broader points can be used and later the hilling attachments. In early cultivations the cultivator can work close to the roots, but not deeper than 2 in.; but later, after flowering, when the pegs enter the soil care should be taken that the plant is not disturbed.

In most soils it is desirable to draw a little of the soil in towards the plant to provide a bed of fine earth in which later the pods may form, and this can be done at each cultivation, finally leaving a flat bed in which the plants are growing with a water furrow between each drill. The height to which hilling may be practised depends largely on the soil. Usually, the heavier the soil the more necessity for hilling.

Soil should not be thrown on the centre of the plant, the object of hilling being to provide fine soil for the pegs to enter and mature evenly and for ease in harvesting. As a rule, in the creeping varieties the pegs easily reach the soil, but in certain cases a light roller run over the crop will facilitate this operation. In the bunch or erect growing varieties no rolling should be attempted, but a final higher hilling made if it is noticed the points have some distance to go to reach the soil.

**Harvesting.**

The time for harvesting is noted in the appearance of the foliage, which starts to yellow or lose colour, and by examination of the nuts. If the majority of the berries or peas are full grown and the inside of the shell has begun to colour and show darkened veins, the crop is mature and harvesting should not be delayed.

If the crop is harvested too early the proportion of "duds" is very great, while if deferred too long some of the nuts may germinate and others become detached from the plant when lifting, while the tops, having lost most of the leaves, will be of much less value for fodder. In some soils, notably the friable chocolate volcanic loams, the plants may be lifted by hand, when most of the nodule-bearing rootlets are left behind and only the root stock with the nuts are lifted. In other cases it is necessary to loosen the soil before lifting out. In small areas this is sometimes done with the digging fork inserted under the plant, which is lifted while the fork is worked underneath. In large areas a potato digger with an endless belt elevator from the shovel point is found very effective where the soil is dry enough to fall through the slats of the elevator and the crop is free from weeds.

A very satisfactory digger could, however, be made on the farm or by a local blacksmith by attaching to an ordinary wooden plough beam a knife edge to go under the plant and cut the roots just below the nuts; finger bars at the rear of this knife edge would lift the plants and loosen the earth, thus facilitating the lifting by hand. The width of the knife edge should be sufficient between the attaching portions to the beam to allow of the whole plant passing through, and the depth should be regulated by the wheel or wheels in front. Perhaps a better idea might be given by taking the back off an ordinary earth scoop, together with all the bottom excepting 6 in. in front, and substituting finger bars slightly elevated to carry the plants and attaching the whole to a plough beam with handles. In a digger of this description, where one horse is used, the digging attachment would be to one side of the beam, while with two horses it would be in the centre, the operator straddling the row and the depth regulating wheels being preferably two, one on each side of the line of plants.

Where an ordinary plough is used the share should cut 10 or 12 in. wide, and the mould board removed and some rods substituted to prevent the tops being mixed with the soil.

It should always be remembered that the cutting of the roots as close to the pods as possible results in the greater quantity of nitrogen being returned to the soil.

Harvesting should not begin until the dew is off and the tops are dry, and the operation should be regarded as a hay-making of the tops, and not more than can be handled should be lifted in any one day.

**Curing.**

After the plants are lifted and the soil shaken from the nuts they are allowed to lie either spread on the ground or in small bunches until the leaves are wilted, but not curled or brittle. They are then bound in small sheaves or taken separately and

stacked until cured. The time in which the plants are allowed to wilt varies according to the weather, and in some cases stacking may be necessary within an hour of lifting.

The usual method of curing peanuts where the quantity is large is to place them in small stacks around a pole. From twenty to thirty poles will be required for an acre.

These poles should be reasonably stout, from 2 to 3 in. of hardwood in diameter at the bottom end, which should be sharpened. When erecting, holes are made in the

Plate 65.

Peanuts in the shell, Graded for sale.

soil with a crowbar, post-hole digger, or earth auger, and the pole inserted or driven down with a mall to a depth that will ensure their not being blown over with the weight of the stack upon them. Crosspieces about 3 ft. in length are now nailed across the post at right angles, one immediately above the other, 9 to 10 in. above the level of the ground; 3 by 1-in. hardwood battens answer the purpose admirably. According to the crop, six or seven rows are taken on each side of the poles, and the plants, when wilted, forked into one row on either side of the pole. When stacking, a few vines are placed across the crosspieces, which keep them off the ground, to form the foundation. The vines are then stacked by hand with the nuts next to the pole and tops outward, pressing down each layer and building evenly around the pole. From time to time a bunch should be divided and hung around the pole to bind the mass and to assist in keeping the centre high.

This latter is important, in that it allows any rain falling to run off. When the stack is approaching 3 ft. high the vines should be drawn closer round the top and finished off with a cap of grass as a thatch to run rain off. It is important that free circulation of air should obtain through the stack in order to facilitate curing. The building of thick or high stacks or pressing them too tight will tend to cause heating, with consequent damage to both fodder and nuts.

After about two weeks in the stack the peanuts may be stored in the barn, but the nuts should not be picked from the vines until preferably six weeks from the date of harvesting, as if picked too soon they are liable to shrivel, and there is danger of fermenting or moulding after picking.

**Picking.**

The usual practice in this State has been to pick the nuts from the cured plants by hand—a tedious process, the cost of which, if the ruling rate of wages were paid, would be prohibitive, since 60 lb. is considered a fair day's work. This practice of hand picking has been followed for ages, and is still the usual method adopted in countries such as India, China, Japan, &c., where labour is plentiful and cheap. In certain cases, too, the nuts are washed by agitation in frequently changed water and dried in the sun to obtain a clean inviting article for edible purposes. This is necessarily a costly undertaking, and would need a much higher price for washed nuts to compensate.

Other methods adopted in North Queensland with a lessening of expense have been, in the case of the bunch nuts, to hold the stems in the hand and thresh the nuts off by beating across tightly-drawn wires or the edge of a board placed midway across a box or other receptacle to hold the nuts, and with both bunch and creeper to rub the whole plant over a wire netting drawn tight until the nuts fall through. Subsequent winnowings remove trash and light pods, and it is stated thoroughly drying the resultant nuts in the sun will cause the stems or tails to break off in the bags, resulting in a clean sample when it reaches the market.

In other lands, however, labour and time saving machinery has been evolved which does very satisfactory work in picking, stemming, cleaning, grading, and bagging for market, without breaking or damaging any appreciable quantity of the pods.

Two types of pickers are on the market in the United States of America—one working on the principle of a cylinder grain-thresher and the other one in which the plants are drawn between spring points over a wire mesh in such a manner that the nuts are pulled off and fall through on to a conveyor, which carries them through a winnowing process to a stemming apparatus, after which they go through a further winnowing and a cleaning and grading process. Two machines of the latter type are in use in the Cooktown and Tableland districts respectively.

The cost of machines of this description is too great for the individual in most cases, and it would be advantageous, where any considerable area was under crop, for farmers to co-operate in the purchase, when the machine, which is on wheels, could be transported from farm to farm.

Contract picking is a feature in the United States just as contract chaffcutting is in Australia. The picking crew, working day after day, naturally become expert; so that a greater average quantity is handled daily with less damage than when novices or hands out of practice are engaged.

When a power-driven picker is in use it is advantageous to place it in a central position in the field where the poles with the stacked peanuts can be transported bodily to the machine, resulting in less handling. With suitable uprights with a cross bar attached to the dray a lever with a grip attached to the top of the pole and passed over the cross bar would use it as a fulcrum, when the long end of the lever

being lowered to the shaft would lift the pole entirely clear of the ground, allowing of its quick and easy transport to the picker.

The stems or vines of the plant, after the nuts are detached by the picker, can be stacked, baled, or chaffed and used for forage purposes, while the "dud" nuts (small or immature) can be fed to stock.

## Marketing.

The nuts are usually bagged whole and shipped to the buyer, but where freights are high it is sometimes more remunerative to market the kernels only.

Special machinery is available to shell peanuts with a minimum of damage to the kernels. Bruising of the kernel at shelling or during transport is injurious, as decomposition is liable to set in and rancidity occur.

Shelled kernels should also be absolutely dry before packing for the same reason. Each variety should be kept distinct, whether shelled or unshelled, as oil millers are understood to give lower prices when the kernels are of different colours.

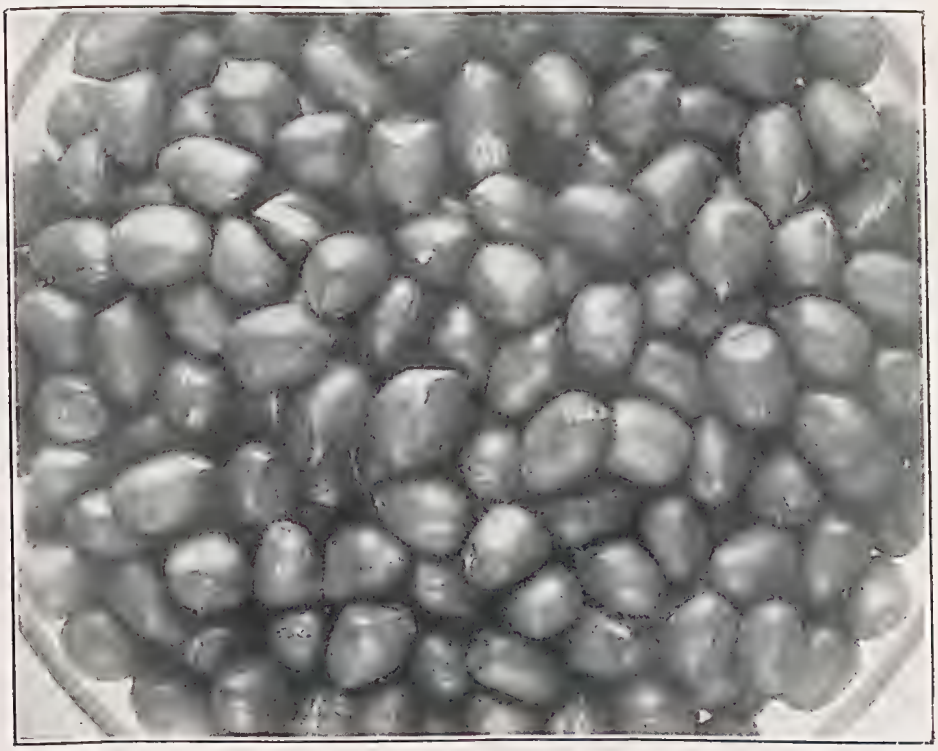

Plate 66.

Peanuts—Graded kernels ready for market.

## Diseases.

The peanut is seldom subject to disease when grown under proper conditions of soil and drainage. The most common disease noticed in Queensland is a form of leaf spot (*Cercospora* sp.) which appears as brownish spots on the leaves and is most frequent on sour or poorly drained land. When this appears late it will be possible with the upright growers to mow the tops and make hay before they are too far gone. Another disease that has been noticed on occasion is a kind of fungus attacking the stem where it enters the ground and is characterised by a cobwebby appearance, due to the mycelial threads of the fungus on the stem just below the surface, together with the appearance of minute round white or brown bodies the size of mustard seeds, which are the spore cases of the fungus. A proper system of drainage, together with liming and a rotation of crops, will minimise disease in the peanut as with other crops.

**Pests.**

Insect pests are of infrequent occurrence, so far the only attack noticed in the State being odd instances of mealy bugs on occasional roots.

Vermin are very partial to the nuts, as are many birds outside those domesticated.

The duty recently imposed by the Commonwealth on peanuts and peanut oil is as follows:—On peanuts from the United Kingdom, 2d. per lb.; other British countries, 3d.; foreign countries, 4d. On edible oils, which include peanut oil:—From United Kingdom, 2s. per gallon; other British countries, 2s. 6d.; foreign countries, 3s.

The protection afforded by this tariff should compensate for the additional costs in growing under white labour conditions in Australia, and peanuts should become a staple crop in North Queensland.

**Yield.**

The yield of the peanut crop will, of course, depend on the fertility of the soil, amount of rainfall, and attention bestowed.

While it will bear a satisfactory crop under a small rainfall, showing to an extent that it is drought-resisting, it is not injured by excessive rains provided the soil is well drained. An instance of this was observed at Banyan in 1921, where a perfect sample of the Red Cross variety was seen which had experienced a fall of 120 in. of rain in the growing period.

Crops on a small scale have been estimated to produce 3 tons to the acre, and in the North field crops averaging 1 ton and over are not uncommon; but as a general rule, in satisfactory soils and under ordinary conditions with proper cultivation, 15 cwt. per acre might be expected as a fair average yield.

Where the crop grows to perfection, as at Cooktown and the Tableland, there is a fine opportunity for the institution of a co-operative oil mill and the purchase co-operatively of labour-saving machinery in picking, &c. In the growing of peanuts for marketing as whole nuts, it frequently happens that the product is not readily saleable owing to stained shells, glutted market, or other causes, when the presence of an oil mill will be advantageous.

The districts mentioned are in a particularly good position for the establishment of an oil mill, since freight on the whole nuts to the Southern parts is high and a ready market for the cake is to be obtained from the dairymen and pig raisers near at hand.

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## QUEENSLAND WEEDS.

By C. T. WHITE, Government Botanist.

### TWIN LEAF *(Zygophyllum apiculatum).*

*Description.*—A bright green, succulent herb (dying a yellowish green), growing in large clumps about 2 ft. high; stems angular, flat on one side and convex or rounded on the other. Leaves composed of a single pair of leaflets; common petiole or leaf stalk, winged, about ½ in. long; leaflets mostly about 1 in. long and ¼ in. broad, elliptic in outline, very oblique (i.e., unequal sided, the midrib not dividing the leaf into two equal parts). Flowers, yellow, about ½ in. across on slender pedicels in the upper leaf axils. Fruit (seed-vessel) about ⅓ in. in diameter, five-celled and prominently five-angled; each cell containing a single dark brown, flat seed, 2 to 3 lines long and 1 line broad.

*Distribution.*—A native (but not found outside Australia). It is found in all the States.

*Common Name.*—Though very abundant, I have not heard a local name given to it. The Plant Names Committee, the Field Naturalists' Club of Victoria, have suggested the name Twin-leaf for members of the genus, distinguishing the present species as "Pointed Twin-leaf," which is really a translation of the botanical name.

*Botanical Name.*—Zygophyllum, from the Greek *zygos*, a yoke, and *phyllon*, a leaf, in reference to the paired leaflets; *apiculatum* from the Latin *apiculum*, a little point; probably referring to a little point or appendage at the top of the leaf-stalk between the leaflets.

*Properties.*—About half a dozen species of the genus Zygophyllum occur in Australia and all probably possess similar properties. They have been accused, both here and in the other States, of being poisonous to stock, but not on very

PLATE 67.—TWIN LEAF *Zygophyllum apiculatum.*

Fig. 1.—Portion of Plant (half natural size).
Fig. 1a.—Flower (natural size).
Fig. 1b.—Seed Capsule × 1½.
Fig. 1c.—Seed Capsule seen from top, × 1½.
Fig. 1d.—Seed × 4.

definite grounds. Though the present species is extraordinarily abundant in parts of Queensland, and during times of drought may be the only green feed seen, I do not remember having seen stock eat it to any extent. The late Mr. J. H. Maiden, however, writing in the "Agricultural Gazette" of New South Wales (Vol. XI., p. 24) quoted Mr. Max Koch, a well-known botanical collector, as stating about Zygophyllums that—"They form, in a good season like the present one, a most valuable adjunct to the winter pasture, providing succulent, if not very nutritious, fodder for both cattle and sheep. My horse is always ready to make the best use of a short halt by feeding on the plants indiscriminately and with a relish, and the cropped appearance of a neighbouring paddock which is stocked with sheep is ample proof of the usefulness of these plants. The foliage being of a watery nature, enables the sheep to do without a drink during the winter months as long as the herbs last, and to feed in the more remote portions of the paddocks. This is a matter of great advantage to the sheep-farmer, for the pasture near the wells (Mr. Koch is speaking of the dry country of the interior.—J. H. M.), which is more or less heavily punished during the ever-recurring spells of dry weather, has an opportunity to recover. They mature seed in abundance, and perpetuate their kind regularly, provided seasonable rains fall at the end of February or the beginning of March." This would seem to indicate that the plants are not poisonous, but have a definite fodder value.

*Botanical Reference.—Zygophyllum apiculatum* F. von Mueller, in Linnæa XXV., 373, and Pl. Vict. I., 101.

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## *SOLANUM AURICULATUM*—A "WILD TOBACCO."

*Description.*—Large spreading shrub, leaves and branchlets covered with a soft velvety pubescence composed of stellate hairs. Leaves green above, paler (almost white) beneath, due to the dense velvety covering of hairs, peliolate or stalked, with a couple of prominent auriculate (somewhat ear-shaped) stipules at the base of the leaf-stalk, broadly lanceolate or elliptic-lanceolate in outline, large but very variable as to size according to age and growth of the plant. Flowers bluish-purple, on dense heads (cymes) 2-3 inches across at the ends of the branchlets, the heads (cymes) stalked, the peduncle (common stalk), branches, and calyx lobes densely stellate-pubescent. Individual flowers nearly ½ inch across. Berries borne in dense clusters 4-5 inches across; the individual berries yellow when ripe and about ½ inch in diameter, full of a watery pulp and very small straw-coloured seeds.

*Distribution.*—A native of Brazil, no doubt originally introduced as an ornamental shrub, now one of the most persistent and troublesome weeds on farms in the "scrub" (rain-forest) belts in coastal Queensland. The seeds are carried by birds, and the plants come up in great abundance after a burn. A similar species that smothers farms in the same way is the native *Solanum verbascifolium.* This is easily told by having white, not purple, flowers and no auriculate stipules at the base of the leaf-stalk. Both go by the name of "Wild Tobacco," a name also applied to other Solanaceous plants in Queensland.

*Botanical Name.*—Solanum; origin doubtful. J. C. London, in his "Encyclopædia of Plants," says, "By some ingenious commentators this word has been derived from *solari* to comfort; the derivation may be possible but the application is not evident"; auriculatum from the Latin *auricula*, the ear-lap, referring to the small ear-like stipules at the base of the leaf-stalks.

*Properties.*—The berries are eaten by birds (including domestic fowls) freely without ill-effects following. No cases of poisoning by children eating the berries has come under my notice, but, as a general rule, I think they are avoided by them; no doubt in their green state, like most species of Solanum, the berries would be dangerous.

*Eradication.*—One of the most difficult plants to eradicate; hoe chipping in the young state is probably the most satisfactory; brushing the adult plants and burning off generally results in a fresh crop of seedlings. For satisfactory results the plants must be attacked before reaching the seeding stage, as the amount of seed produced on a single plant is enormous. Arsenical sprays might be tried on the young plants, but we have no definite knowledge of the effect of these on this weed. The following general spray for weed eradication has been recommended by the Agricultural Chemist (Mr. J. C. Brünnich):—

> "Half a pound of arsenic dissolved by means of one quarter of a pound of caustic soda in three gallons of water, and the solution then diluted to ten gallons with water."

*Botanical Reference.—Solanum auriculatum,* Aiton Hort. Kew. I., p. 246.

PLATE 68.—SOLANUM AURICULATUM.

Plate 69.—Queensland Agricultural High School and College—Teams Mustering at Stables.

PLATE 70.—QUEENSLAND AGRICULTURAL HIGH SCHOOL AND COLLEGE—TRACTOR AND REAPER THRESHER AT WORK.

# BUDDING AND GRAFTING.

By JAMES H. MITCHELL, Fruit Inspector.

INCREASING the number of plants of any species is known as propagation. Plants propagate naturally in two distinct ways—namely, by seeds and by plant division, and from these natural methods certain artificial methods of propagation have been developed, and are now practised in fruit culture.

All varieties of fruit plants originally produced seeds, and the majority do so at the present time, but as the seed in most cases is produced by the union of elements from two plants, the new plant will have some of the character of both parents, and may resemble neither of them very closely.

For example, a Rome Beauty apple growing in an orchard will very probably receive pollen from some other tree; if the seeds from the fruit produced by this flower are planted they will in turn produce trees that will possess some of the characters of both parents, and it will be impossible to know in advance what the fruit will be like. For this reason plants are not usually propagated from seeds, except for raising seedling stocks. Propagation by division in one of its forms is generally employed for propagating fruit trees.

A method of propagation commonly used for many of the fruit trees is known as grafting. It is the causing of a twig, called a scion, cut from one plant to become part of another. The plant to which the scion is joined is known as the stock.

The different kinds of grafting may be classified in respect to the place where the scion is attached to the stock—namely, root grafting, or the insertion of the scion in the stock at the surface of the ground; stem grafting, or the insertion of the scion on the stem or trunk; and top grafting, or the insertion of the scion in the top or branches.

Grafting is also classified, in respect to the way in which the union between the scion and stock is made—namely, cleft grafting, kerf grafting, bark grafting, whip grafting, splice grafting, veneer and herbaceous grafting.

## Cleft Grafting.

Cleft grafting was the method commonly used for renewing the tops of mature deciduous trees (but now superseded by strap grafting), and also for two-year old stocks of vigorous habits. The method is to sever the branch or stock with a saw or secateurs; the exposed part is then split with a grafting tool or chisel, and the cleft is spread with a wedge or similar tool ready for the reception of the scion. The scion is cut to a wedge shape at the butt, one edge of wedge being left thicker than the other, and is set into the stock with the thick edge outside. This will hold the scion firmly in position, and the greatest pressure will be on the outer edges where growth takes place. In order to ensure growth there must be contact between the growing tissues of the stock and scion.

The grafting is done in the spring when the sap in the stocks is then just starting to rise. The scions require to be dormant, and care must be taken to see that they are removed from the parent before the rise in sap, and stored in a cool, moist place. It is usual to leave three or four buds on each scion.

The growing part of a stock is the outer part of the wood just underneath the bark. In making a cleft graft it is usual to insert a scion on each side of the cleft, and if both scions grow the least desirable one is cut away. To complete the graft the union is tied tightly round with string or raffia, and the whole covered with a grafting wax to exclude the air. A grafting wax may be made of the following ingredients:—Resin, 4 lb.; beeswax, 2 lb.; tallow or linseed oil, 1 lb.

The resin and beeswax should be broken into small pieces and melted with the tallow or linseed oil—when thoroughly melted the mixture should be poured into cold water, and when cool enough to handle should be pulled and worked until it is light coloured and grained. In applying the wax the heat of the hands is sufficient to soften it.

Another method for making grafting material, and perhaps as good as the above, especially for grafts at the surface of the ground, is a mixture of clay and horse or cow manure, and covering up with the soil in the nursery row.

## Kerf Grafting.

In connection with the grafting of large stocks, a method of setting the scion is sometimes followed differing slightly to cleft grafting. By this method the stock is not split, but a kerf or notch, as long as the scion, is made each side of the stock,

trimmed with a knife, and the scion cut wedge-like to fit. It is claimed as an advantage over the cleft grafting that the wound heals more quickly, and the probability of growth is just as sure. A disadvantage of this method is that the scion is not held in position so firmly.

### Bark Grafting.

This is a method of grafting that does not injure the stock so much as cleft grafting. The lower end of the scion is cut clean across with a sloping cut 1 inch to 2 inches long and inserted under the bark of the stock after the top has been cut off. It is then bound and treated in the same way as recommended for the other methods.

### Whip Grafting.

This method is used almost universally for root grafting, and for small limbs and stocks. In making a whip graft, the stock is cut off and a slanting cut is made at the top of the stock with a sharp knife. The knife is then placed on the cut surface near the top, and the stock is split in the direction of its longest axis thus forming a tongue. The scion is treated in a similar manner, and the two are forced together—the tongues helping to lock the scion and stock together.

Some difference in the size of the stock and scion may be disregarded, provided one side of each makes a good union. When roots are whip grafted it is not necessary to use grafting wax because the soil will keep out the air sufficiently. In making root grafts the scion is made with three or four buds, and the piece of root of corresponding length.

### Splice Grafting.

This method is similar to whip grafting with the exception of the tongue. The scion and stock are both made with a sloping cut, brought together and tied in the usual way.

### Veneer Grafting.

In this method the stock is cut off and half cut through a few inches lower down, and the piece removed; in other words, the stock for a length of 1 to 3 inches from the top is halved, the scion being treated in the same way and the two brought together and tied and treated as for the other form of grafts.

### Herbaceous Grafting.

By this method the stock is not beheaded. A tongue is made on the side of the stock and the scion is cut to a thin wedge shape and inserted between the tongue and the stock. The head of the stock is removed when the scion has made satisfactory growth. By the other methods of grafting the stock has to be severed, and in the event of the scion failing the stock becomes useless, whereas in herbaceous grafting the propagation can rework the misses. This method is satisfactory when applied to custard apple and various other fruits.

### Stocks.

The first aim of the propagator is to produce strong, vigorous stocks, best suited for the particular class of fruit tree he wishes to work. As the life and health of a worked fruit plant is largely influenced by the stock on which it was worked, too much care cannot be exercised in selecting the seedlings.

To raise seedling plants, seeds should be selected from well developed fruit, taken from a vigorous tree. On being taken from the fruit, the seed of evergreen trees should be washed, then dried in the shade and immediately planted. With deciduous fruits it is stratified in damp sand until the following spring.

### Seed-bed.

A fine, well-worked soil is an incentive to good germination, and the seed should be planted with a covering of up to half an inch of soil, well pressed down, and the bed should be kept moist and well shaded until the seedlings have hardened their first two leaves. The seedlings will require constant attention as regards watering to ensure an even vigorous growth, until within a week or so of transplanting, when they can be hardened off by the cessation of watering. It is not wise to transplant when the seedlings are making young soft growth.

### Selection of Seedlings.

When planting out in the nursery rows all plants with curly or malformed roots must be discarded.

### Site for Seedlings.

The ground intended for the reception of the seedling in the nursery must be thoroughly worked and brought to a fine tilth. The surest way to do this is by honest hand digging, thus ensuring a greater capacity for holding water, and the admittance of air—both vitally important to the growth of the young seedling.

By making the nursery rows 2 ft. 6 in. apart the use of horse-drawn implements will save time and labour.

In transferring the seedlings from the seed-bed to the nursery care must be taken that they are not allowed to become dry. A proportion of the tops must be cut away to balance the loss of some roots and to allow the plants to adjust themselves to the shift. In most varieties of stocks they are ready the same season for the insertion of the bud, but in the case of stocks for grafting it sometimes takes two seasons.

### Budding.

This is a method of propagation more practised in plants than in any other. It consists of inserting a single detached bud from the parent plant under the bark of a seedling or young limb known as the stock. The operation of budding can be performed when the sap in the stock is rising and showing, when the bark is raised, a light green colour, and when mature buds can be obtained. These conditions may be obtained in the early spring and again in the late summer.

### Selection of Bud Wood.

The buds used for budding must be selected from a proved productive tree of vigorous habits and growth; clean healthy shoots with well developed buds are essential. In all these operations it is hardly necessary to state that the tools should be first class and keen-edged.

### When Buds Fail to Grow.

There are times in the budding season when the buds fail to grow although the bark of the stocks is lifted. This is explained by a study of the growth of a plant. When the sap is moving upwards a jelly-like mass is deposited on the outer surface of the wood under the bark and there is a thickening of the girth of the plant. In its descent the sap follows a different course—merely hardening the jelly deposit with no increase in girth. One of the surest signs to follow for successful budding is to note the colour when the bark is lifted. If it is a light green colour the time is favourable; if, on the other hand, it has assumed a yellow appearance, it is better to wait for the next upward flow of sap. The operation of budding in itself is quite simple and a good result is easy of attainment, provided the necessary conditions before mentioned are observed.

The stocks are allowed to grow until they are the girth of a pencil or somewhat larger, and the bud is usually inserted at or near the surface of the ground.

For the reception of the bud a T-cut is made—the cross cut is usually made first and after making the last cut the knife is twisted to right and left before taking it out, in order to loosen the bark. The bud is cut off the bud stick as close as possible to the bud and with about half an inch of bark on each side of the bud.

Some propagators advocate taking the small portion of wood behind the bud out before insertion, but it is not absolutely necessary. The bud should be tied in its place fairly tightly, beginning the tie at the bottom end.

### Tying Material.

Raffia makes a satisfactory tying material, provided it has been moistened with water before it is used. At the expiration of ten to fourteen days the tie must be cut, otherwise girdling of the stock will result. When the bud is set late in the autumn it does not start into growth immediately, but remains green and dormant until the following spring when it starts into growth.

### Stimulating Growth of Buds.

When buds are slow in starting into growth the stock cut partly through causes more sap to be directed to the bud; on no account at this stage should the stock be completely severed.

In several varieties of fruit trees the young growing tree is trained to a stake to keep the stem perfectly straight.

The young trees at a certain stage are headed to form the permanent head. This operation is not performed until the tree has attained at least a foot of growth above the desired height, thus ensuring a good firm stem and fuller buds.

### Budding old Trees.

This method of budding can be carried out on old trees, but as it is a difficult matter to insert the buds under the old hard bark of the stems and branches, it is usual to head the trees back to the desired height and allow them to make young shoots. These can be selected and budded on the following season. Trees headed back during winter may generally be budded the following autumn.

### In Arching.

This method is really grafting by approach, inasmuch as the stock is taken in a receptacle, or planted in close proximity to the tree from which it is desired to propagate.

### Bud Selection.

It is evident that trees worked by budding and grafting will possess all the good or bad characteristics of the parents; such being the case, it is very important that every care should be exercised in the selection of scions and buds from only the most prolific, high-class, vigorous trees.

### Stock in Relation to Growth.

It has also been proved that a vigorous tree is retarded in its growth if stock of a less vigorous strain is used for the reception of the scion or bud. It is a fairly safe rule to work most varieties of fruit plants on stocks of their own genus, as, for example, sweet orange on sweet orange stock, lemon on lemon stock, peach on peach stock, anona cherimoyer on anona cherimoyer.

Although nearly any bud on a tree may be successfully inserted and made to grow, only clean, healthy shoots with well-developed buds should be selected; these will develop into strong, vigorous trees and be less likely to be attacked by disease.

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## FALL IN LOVE WITH YOUR WORK.

"We are fortunate in our manager—he is more than capable, he is in love with his work." That is what a man of many business interests said to "Country Life" the other day, in discussing a certain business. Isn't that the sort of man we are all looking for?

Yes, he is hard to find. Every executive worth its salt is on the lookout for him, and holds on to him when they get him. To be sure, there is a limit to what they can pay him, but they will pay up to the limit—and perhaps risk a bit extra.

The man who "watches the clock" or has a grouch against "the boss" will never go far—in that business. The probability is that he will not succeed in any other. His policy to do no more than he is paid for, means he will never be paid any more than for what he does—and he is cramping himself as well as his business. Mediocrity, or worse, is a-yawning for him.

It comes back to this: Every employee is directly interested in the business that pays him wages or salary. He is a partner in the concern, and its success is his success. This applies to business and industry throughout Australia, and the sooner it is really recognised the more likely we are to arrive at sound industrial relations.

You know how it is on station or farm. You would like your employees to take a personal interest in the products, and to rejoice when they top the market, or make a particularly good sale, or carry off the prizes. We believe this happy relationship exists on a great many country properties. The best advice that can be given is, "encourage it." We want to see it fostered in shop, and office, and factory.

Likewise, the best advice to employees is, "Fall in love with your work"—that way lies success. If you cannot fall in love with your present work, work up to the work you can; or, if necessary, change your work. As a witty American puts it: "An artist is a man in love with his work." Let's all try and be "artists."—"Country Life" (Sydney).

## STOMACH WORMS IN SHEEP.

The sheep should be drenched with a mixture of arsenic and Epsom salts. The ingredients are 2 oz. arsenic (95 to 98 per cent. purity), 6 lb. Epsom salts, to 5 gallons water.

*To prepare.*—Bring 2½ to 3 gallons of water to the boil, then add the 2 oz. of arsenic and the 6 lb. Epsom salts. Stir and bring to a brisk boil. Boil vigorously for about five minutes and stir well. Then allow to simmer for half an hour longer, stirring occasionally. Add cold water to make up to the 5 gallons. This mixture will now be ready for immediate use.

Dose for grown sheep, 2 fluid oz.;

For weaners, 8 to 15 months, 1½ fluid oz.;

From 4 to 8 months, 1 fluid oz.

Lambs under three months old should have the dose reduced according to size and age of lamb. If the milk secretion is good, the lambs will not need drenching, but if eating grass freely they will pick up the worms and suffer more severely owing to their weaker constitution, therefore drench them if necessary. A flask can be procured suitable for administering the drench according to dose, otherwise a sauce bottle will be found suitable, but will require to have the dose measured properly. The sheep should be kept away from food and water for at least twelve hours before drenching (if not already starving), and about four hours after drenching (at least from water).

The sheep should be on all fours while being drenched, the operator holding the sheep between the knees with the left hand under the jaw and the right hand administering the drench with the flask. Should the sheep struggle or cough, discontinue pouring the drench and wait till the sheep becomes normal before continuing. It is usually found most convenient to run a number of sheep into a narrow lane (about 30 in. wide) for drenching purposes.

The worms hatch out freely with moisture during warm weather, at which time they increase quickly, but usually cause very few deaths until autumn and winter. Spring is the best and most effective time to drench to keep the worms in check. To reduce the worm trouble, the first two drenches should take place at intervals of eight days, and then continue the drenching at intervals of twenty-four days during summer and autumn. In doing this, with a change to fresh pasture, the sheep may be got free from worms after fifteen months' treatment.—J. CAREW, Senior Instructor in Sheep and Wool.

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## BLUESTONE DRENCH FOR STOMACH WORMS—

### *(STRONGYLUS CONTORTUS).*

As a change from the arsenical drench, the bluestone and mustard drench can be successfully used, say, every third or fourth drench. The ingredients are 1 lb. bluestone, 1 lb. fresh mustard, 10 gallons water.

*To prepare.*—Suspend the bluestone in soft or rain water, secured in a piece of hessian. Mix the mustard in a little water until thoroughly moistened, then dilute with larger quantity and mix with bluestone water, which is made up to the full quantity of 10 gallons.

When all the bluestone is dissolved, it should be well stirred, and administered in correct doses.

Grown sheep, 4 fluid oz.;

Weaners, 12 months old, 3 fluid oz.;

Lambs, 4 months old, 2 fluid oz.

The bluestone water should not come in contact with metal; wood or enamelware is suitable. Care must be exercised in administering this drench, as it is a bigger dose than the arsenical dose, and takes longer to swallow. The sheep are more apt to take it on their lungs, which is injurious and may prove fatal. This drench is useful if administered after giving the sheep the same treatment as recommended for the arsenical drench.—J. CAREW, Senior Instructor in Sheep and Wool.

# CATTLE BREEDING AND WORK.

By H. ANNING, Wetherby, via Richmond, Q.*

I MAY mention at the outset that in writing about cattle I am merely giving utterance to the results of my own experience and observation for the consideration of the uninitiated, and have no wish at all to lay down the law to cattlemen. It is a big subject, and as one old timer said to me once: "You can never learn the lot of it." Seldom can two cattlemen be found to agree on the subject, even after spending their lives at the game.

## The Importance of a Quiet Herd.

One statement may be made, with which all must agree. Of course, the chief end, aim, and object of men engaged in cattle raising is to make money, and to do that it is essential to have a quiet herd. Different men may argue as to the means whereby cattle may be thoroughly quietened, but I believe cattle are something like men, *they want a home*, and a nice one at that. Therefore time and money spent in picking good camps, well shaded, soft, and handy to water, and the thorough breaking in of cattle to those camps, is very well spent indeed. Weaners should be herded regularly every year, and by a good man. The best man is none too good. They should be fed and watered every day as carefully as fat bullocks, put on the same camp every day at lunch, where it is advisable to have some salt in troughs. From a month to five weeks is long enough to keep them in hand. They will never forget the handling or the camp.

## Types of Cattlemen.

Speaking of cattle, the figure of one man rises before my eyes—James Tyson, the cattle king. He was a great man, honest with himself and the world, shrewd, clever, and observant; a fine bushman, a good man over men, and one who knew how to pick his men. Living and working hard himself, he expected his men to do likewise, consequently he was often bitterly reviled. Of the many stories told about him, one is most instructive. When he was quite a lad he had the hardest job he ever took on. His work was to hold cattle on new unfenced country. Cattle don't like leaving their homes. If taken away from sour, poorly grassed country, and put into richly grassed paddocks they will hang on the fences and sulk for months. Placed on unfenced country, they will naturally keep making back, and once started they waste very little time, making across country in a direct line—they are fine bushmen. It takes months and months of careful patient work to settle them down on new pastures.

Tyson found his job was no joke. Getting up early, he used to put a bit of tucker on his saddle and ride round the tracks. When he found any heading back he followed these until he overtook the cattle, sometimes having to ride 30 to 40 miles before coming up to the leaders. Then he had to drive them back, watching them on his own at night. After these jaunts he used to arrive back, hungry, sore, and exhausted for want of sleep. It was hard, unthankful work, and the cattle never seemed contented. He was decidedly pleased when he got another job.

An old chap, with a white and patriarchal beard, took over from him; a slow peaceful-looking old joker. Probably he never put a horse out of a walk! "My word," thought Tyson, "there won't be many cattle here in three weeks' time." However, he was wise enough to say nothing. Months afterwards he came back, and rode up to the old chap's camp. He was asleep! Tyson woke him up, and the old man asked him to stay for the night. In the course of conversation he told him the job was all right, but a bit too lazy-like. The cattle were quiet and settled down. To verify these astonishing statements Tyson took a ride round next morning with his host. What he saw fully bore out the old man's assertions. "The difference between us," he said, "was that the old man understood cattle, and held them with about one-tenth of the riding I had to do, and the longer he stayed on the job the quieter the cattle became, until finally he found it a bit lazy."

Because Tyson was able to learn vital lessons so quickly and easily must have accounted for much of his success in after life. Tyson was a great man all right, and nothing was more typical and characteristic than his final leave-taking. He knew his hour was nigh, but he make no fuss, and worried no one. He had done his life's work, and was about to turn in for his last camp. He was content to pass out, and let the future unfold itself.

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* In the "Pastoral Review" for June.

### The "Galloping Musterer and Others."

I have met many different kinds of cattlemen. There is the "galloping musterer" (usually a young man). He wears fierce-looking spurs, carries a diamond-plaited whip, with curious ornamental handle, a cabbage-tree hat, and often a beautiful silk handkerchief around his neck. He will ride anything and through or over anything. He starts away from camp just after daylight at a gallop, and men and boys follow, through timber, over holes, &c. He pulls up for a few seconds and in a breathless way tells Joe to take Jimmy and Friday and clear down to One-Tree Camp. Starts off again and repeats the order to two or three others anent another piece of country. All his work is in keeping, and young men adore him (as a rule).

The best I have seen were old slow-going chaps. One in particular I have in mind told me he had no time for cattle, but preferred billiard-marking, only he couldn't live in town. I was somewhat young when I met him, and fancied myself more than a little, and felt rather a contempt for the old chap and his sentiments. He was a little roly-poly of a man. No leggings or whip, and only one short little rusty spur. He rode a rather unambitious sort of prad. He had a rowdy herd of "baldies" to deal with, and was just commencing a bullock muster. I knew the country and the cattle, and expected the old fellow to resign after a week's work. However, he jogged placidly out, and commenced to split up the men. By 10 a.m. we had the camp on, and there had been practically no galloping. He always seemed to be just where he should be to stop a mob from galloping.

When the last man came in with a lot, he rode out. "Hullo!" he said, "you've missed some cattle. There was a big bullock running out there with a white stripe along the ribs, and there were ten or eleven other bullocks with him." He cantered out, and after a little while brought them along himself, with the help of a young new-chum lad. He sauntered through the muster and made a good delivery, and after a while men and boys began to think that it must be something more than good luck. Cattle on that place steadied down marvellously. He could ride up to a camp, and the cattle did not even trouble themselves to get up and stretch, and that is the way cattle should be before much money can be made out of them.

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## PIONEER DROVERS—A DISAPPEARING BAND.

By WILFRED STEELE, Yeeda, via Derby, W.A.*

WITH the various railway systems of the Commonwealth encroaching further into the vast interior of Australia, long overlanding droving trips are now few, but the following narrative will recall some famous cattle droving feats, and perhaps serve to show the danger and hardships encountered in opening up the distant tracts of country in the Northern Territory and Kimberley.

In 1872 D'Arcy Uhr overlanded the first cattle to Darwin, although cattle had years before this penetrated into the Territory along the Queensland border line. The next man to follow was Tim Nelson, who journeyed a mob of 100 bullocks along the overland telegraph line from Undoolya to Darwin; this station is near Alice Springs, in the heart of the continent. Three years later followed Nathaniel Buchanan, known throughout the North as "Bluey," with cattle from Rule and Lacey's station, Aramac, in Central Queensland. These cattle went to Glencoe Station.

Alfred Giles in 1878 left Chowla Station, on the Darling, with 2,000 cattle and 10,000 sheep, proceeding down the Murray across to the Burra, on to the Peake Telegraph Station, and along the overland telegraph line to Katherine River. These cattle formed the nucleus of the herd for Springvale and Delamere. Springvale was later abandoned, and Vestey's Manbuloo now occupies that area. The sheep and cattle later went on to the shorter and more nutritious pastures at Newcastle Waters, 260 miles south of the Katherine, and the sheep were finally removed from Newcastle about 1902. This run has long been the property of Messrs. Lewis and Sir Sidney Kidman.

This trip of Alfred Giles and his brother, in my opinion, takes the credit of all pioneering trips in the history of Australia. By far the major portion of the distance travelled, about 2,200 miles, was over unoccupied country, and it was necessary for well-sinking parties to travel in advance of the stock to sink wells and scoop for water in the sandy river beds. The trip occupied just on two years.

* In the "Pastoral Review" for June.

In the vicinity of Alice Springs natives lured from the droving camp some of the boys of the party and murdered them. Fifty years have gone by since this intrepid overlander accomplished this famous trek, and he resided at his station, Bonrook, near Pine Creek, until a few years ago. He is now living at Adelaide, ripe in years, rich and unique in experience, and it is regrettable that he has not received some suitable recognition for his great achievement. Honours are won for far lesser feats to-day.

Mr. Giles is the father of the late Lady Campbell, a very heroic woman, who died a few years ago at Waterloo Station, in the Wyndham district. His great enterprise was on behalf of Dr. William James Browne, a pastoral pioneer of South Australia, who controlled Leigh's Creek, Nilpena, Wilpena, Wonaka, Arkaba, Booborowie, Moorak, and the famous Buckland Park, in addition to many other smaller properties. Dr. Browne's brother, also a medical man, accompanied Captain Charles Stuart in the historic expedition of 1844.

Arrived in Darwin also in 1879 with bullocks, Frank Hann, of Lawn Hill Station, near Burketown. Hann, small and slight of stature, but with the heart of a lion, did much exploratory work in different parts of Australia. He did extensive peregrinations amongst that rugged country of the King Leopold Ranges, between Derby and Wyndham. Many of his marked trees I have seen on the Charnley River and elsewhere, and on several of these I cut away the encroaching bark that was gradually effacing Hann's markings (FH over 1898).

Hann took up Grace's Knob, a rugged run on the outermost limit of settlement, 200 miles north of Derby. The Hann River, the largest tributary of the Fitzroy, is named after him. He also blazed the track from the goldfields to Oodnadatta, and crossed and recrossed that illimitable plain of mirage and thirst, where to-day speeds the luxurious "Trans." train. Hann died several years ago in straitened circumstances.

The influx of cattle into the Northern Territory in the early eighties went on apace, and the following drovers came across from Queensland with cattle for stocking purposes:—Scrutton, Burke, Blair, Fraser, Hayes, Wallace, and Redford. The first named long resided at Borroloola, where he owned Bohemia Downs, and he was also one of the pioneers to Somerset, on the apex of Cape York Peninsula. Redford was also resident near Borroloola, as the manager of Amos Bros. and Broad's Macarthur River Station.

In 1882 "Bluey," brother of W. F. Buchanan, of Killarney, New South Wales, again entered the Territory with 7,000 cattle on behalf of Fisher and Lyons, to commence what is to-day Victoria Downs. Farquharson the same year also contributed with a mob to form the nucleus of this herd, which is to-day about the largest in Australia.

On 15th October Saunders and Johns arrived on the Katherine overland from Roebourne, Western Australia, on an exploring quest. They took a route different and more direct than that of Forrest, two years previously. These were the two first parties from the West to the overland telegraph line.

James Warley entered the Territory also in 1882 with cattle from the Moonie and Balonne Rivers in South Queensland. This was a very long trip, with the destination at Glencoe. Settlement in the following years continued to penetrate still further west, and Sam Croker passed the O.T. line with heifers for W. F. Buchanan's Wave Hill Station. This famous run later branded 25,000 calves in a season.

In March, 1884, W. Button passed the Katherine with 2,000 odd breeders to stock the country acquired by Osmund and Panton, on the Ord River in Western Australia. Other mobs followed to stock this country also, and it eventually became a very large herd, now held by Vesteys. "Bluey" Buchanan took a prominent part in the stocking of the Ord, and altogether his part in the opening up of the Northern ranches was second to no other. The Ord River cattle came from Avington and Beaufort, and the trek across Queensland, the Northern Territory, and into Western Australia was a most creditable performance.

In 1885 and 1886 two families that overlanded across to Western Australia were the McDonald Bros. and the Durack Bros., and their names are still to-day associated with the country that they pioneered. The trip of the McDonald's is, I think, the longest on record, and, in my opinion, the only one to challenge that epic feat of Alfred Giles. They left their Goulburn home in New South Wales with cattle and bullock wagons, crossed Queensland, thence by Settlement Creek over the Territory to Hall's Creek, followed the course of the Margaret River down (now the famous Gogo Station of the Emanuels, taken up by the astute head of that

house, Isidore Emanuel), and finally halted at Fossil Downs, where they built up a large herd of cattle. This station is situated about the junction of the Fitzroy and Margaret Rivers, some 230 miles from the cattle shipping port of Derby. This feat of the McDonald Bros. is a record in that it penetrated the furthest west. For nearly two years every morning at early dawn the heads of the bovines were pointed west for something like 2,500 miles, and when the distant goal towards the setting sun was eventually reached, it was with the original herd much reduced in number. Dan McDonald, of Goulburn, owns Fossil to-day.

The name of Durack has always been intimately associated with the early settlement of Kimberley, and they are still large landholders in the Wyndham district. The Durack Bros., like the McDonalds, overlanded their own cattle from Queensland, being settled about the Cooper River. Losses in cattle overlanded by them greatly increased the expenses per head of those finally delivered. Mr. M. P. Durack represented Kimberley in Parliament a few years back, and last year was chairman of the Beef Commission, inquiring into the disabilities of the industry, and no man is better versed than M.P. on the cattle question of the North.

There are other names of early overlanders that I have omitted to mention. Most of these pioneer drovers have gone still further west to attend the final muster. They have all played a prominent part in the opening up and development of these far-flung Northern ranches, but their great exploits will soon be entirely forgotten, and I trust that the powers that will be—when the railways cross from east to west, over the great droving route—will perpetuate the names of these pioneers by naming the stations after them, and not choose names of politicians as on the "Trans." east-west route.

The early droving route took the course of the coast, named so, but actually many miles from the shore of the Indian Ocean. The present tableland track was then unknown, and many of the mobs were held up by drought for months at a time, the road ahead had to be explored in advance of the cattle to find water supplies for the watering of such large mobs, rations—rough in those distant days—were unprocurable over immense distances, natives were hostile, and disease was rampant with man and beast. Droving was a very different occupation in those days to now.

The writer, in April of 1904, was a member of a party that took the first cattle east from Wave Hill, and accompanied them for thirty-one weeks, covering waterless stages of 95 and 60 miles, so is in some small degree qualified to judge what droving hardships must have been to those pioneer drovers.

From 1904 the route from the Victoria has been via Murranji to Newcastle Waters, and the line of trek is marked by many graves on the roadside—those who have fallen out on the march from malaria and berri-berri. Remote was the chance for one that seriously fell ill on this stage. The drover, often short handed, had to proceed on with the cattle, and there were many lonely deaths, with only the omnipresent willy-wagtail to twitter a requiem.

That some of the droving trips of more recent years were no picnic, I recall the overlanding of 2,000 odd bullocks from Lissadell in 1905, in charge of Walter Rose. This was a very dry year, and the Tableland route impassable. Rose, taking the old established coastal track towards the Katherine, found his progress beyond the Roper stayed, and yards were built to hold the bullocks. Then disease broke out in them, which necessitated letting them go and riding the tracks, the cattle attempting to go back west. Rose then journeyed down to Newcastle Waters for nearly 200 miles to find impassable dry stages further south and east. This indomitable drover again headed for the coastal route, and when near Macarthur River Station left the track and went sheer bush towards Westmoreland. So rough was the going on this cross-country stage that the plant dray was abandoned, and is likely to be there to this day, or what the white ants, bush fires, and brother "jacky" have left of it. Three men died in this party, and for hardship and distance this trip is well in the front during the last quarter of a century of droving. Some of these cattle travelled right into Bellevue, the late Lumley Hill's beautiful station near Brisbane.

The first drovers to lift cattle from the western ranches to the east went out in 1903, and the following year "Jumbo" Smith and Blake Miller lifted Victorias, also Steve Lewis, John Dick Skuthorpe, and Charles Phillot came in with Wave Hills. All these mobs comprised from 1,000 to 1,500 bullocks, and this was the opening of the cattle route via Murranji.

Many of those early pastoral pioneers like Dr. Browne and C. B. Fisher lost an immense amount of money on these Territory ventures, and those that have followed have not yet been rewarded on their enterprises. The industry in the North is still depressed, virtually on its back, and those that hang on look and wait for something that never comes—a boom!

# HOW THE THOROUHGBRED HORSE CAME.*

WITH England rests the proud achievement of having given the Thoroughbred horse to all the civilised nations of the globe. Nevertheless, the horses upon whom have been bestowed the title "Thoroughbred" can in nowise be reckoned indigenous to the soil of Britain, being, so to say, a manufactured article. The word Thoroughbred only came into use after the introduction of Eastern blood into England, and was alone given as a title of distinction to the progeny of the Royal mares imported by Charles II., and other mares of purely Eastern blood, and their descendants, begotten by Eastern sires and their descendants, whether imported from Arabia, Barbary, Turkey, or Persia.

## Early Sires Imported.

Thanks to the love of horses inherent to many of the great nobles and wealthy commoners of England, they commenced to improve the native breed by the introduction of Eastern blood as early as the reign of King James the First, who set them the example by giving Mr. Markham, a merchant trading to the Levant, 500 guineas for an Arabian, described by the Duke of Newcastle as "a small bay horse of not very good shape"; and as there is no account of any of his progeny having distinguished themselves he could have done the State but little service.

The two next Eastern sires of note brought into England were the Helmsley Turk and Sir Thomas Gresley's bay Arabian. The former, who was imported by Henry Villiers, the great Duke of Buckingham, had a most distinguished career at the stud, being the sire of Mr. Place's Bustler (a name to be found in all the best old pedigrees), and Mr. Cooke's Vixen, who was out of the Barb mare who bred Dodworth, the first Anglo-Barb foaled in England.

Gresley's bay Arabian, who was brought into England a year or two later than the Helmsley Turk, was put to the latter's daughter Vixen, with the result of getting the Old Child mare, the great-grand-dam of Mr. Heneage's Silvertail, who bred Careless (winner of twenty races) and Fearnought (winner of five races) to Regulus; while she also bred Warren's Sportsman (winner of seven races) to Cade, when Pot-8-os and all the grand horses descended from that equine celebrity.

## Some Turks went to England.

During the reign of the unhappy Charles I., from 1625 to 1649, there is no account of any Eastern sires of note being brought into England beyond the D'Arcy White Turk and the D'Arcy Yellow Turk; but when Oliver Cromwell ruled the realm under the title of Lord Protector, General Fairfax imported the Morocco Barb, maternal ancestor of Besto, while his studmaster (the same Mr. Place as owned Bustler) imported the White Turk, subsequently known as "Place's White Turk," who did the State no little service, and was a great help towards laying the foundation of the British stud by getting Mr. Croft's Commoner and Wormwood, while he was also the maternal great-grandsire of Cartouch, Grey Ramsden, and Windham, all horses of very high form.

Soon after the Restoration, with Charles II. on the throne, both breeding and horse-racing received an impetus from the Merry Monarch's love of sport as well as of fine horses. He caused the Barb mare in foal with Dodsworth mentioned above to be imported, and also a number of Arabian and Barb mares, on whom the title of "Royal mares" was bestowed, but his Master of the Horse, Mr. Fenwick, failed to obtain any Eastern sire of note for his Royal master.

In the reign of James II., however, there was brought into England by the Duke of Berwick from the siege of Buda (1686) a sire destined to hold a very high place as one of the best early progenitors of the Thoroughbred horse—viz., the Stradling Turk, who, having been purchased from the Duke by Mr. Lister, a gentleman resident in Lincolnshire, became, under the name of the Lister Turk, a famous stallion in that county, where he begat Snake, Coneyskins, Piping Peg, and the dam of the Bolton Sweepstakes.

These were all celebrated horses from whom the blood of the Lister Turk has come down to the horses of the present day; and as no fewer than five strains of this famous Turk were to be found in Eclipse, it would make a rather long sum in addition to tell how many strains of the blood of this Buda warrior are to be found, say, in Mr. Jinks's pedigree chart.

This fact surely tells us that the whole credit of the fine horses now comprising the British breed must not be given to the Darley Arabian, the Godolphin Arabian, or the Byerly Turk, an idea entertained by many who have only curtly glanced through the pages of the Stud Book.

*From the "Live Stock Journal" (England).

James's successor, William of Orange, had but little time from his wars to give to either breeding or racing, and yet two very notable horses of Eastern blood were brought into England in his reign—viz., the Byerly Turk and the Black Barb Chilaby. The former, like the Lister Turk, was another "warrior," called after his owner, Captain Byerly, whose charger he was at the battle of the Boyne, which sealed the fate of the Stuart dynasty; and Chilaby was imported by King William himself, as was also the Barb mare Slugey, in foal to him with Greyhound, who, although foaled in England, was a full-bred Barb.

The blood of the Byerly Turk comes down to our time chiefly through his sons Basto and Jigg, sire of Partner, and through the latter's grandson Herod; while the blood of Greyhound, although he got several fleet runners, was subsequently known only through Lord Halifax's Sampson, whose dam was a Curwen Barb mare, and must not be confounded with Sampson, the son of Blaze, who was sire of Engineer and Bay Malton, who were the early progenitors of several of the great horses.

## Yorkshire's Good Work.

It was early in the reign of Queen Anne (1702-1714) the arrival of the Darley Arabian in Yorkshire (where the Leeds Arabian had been located a year or two previously) occasioned extraordinary rivalry among the noble and wealthy families resident in the three Ridings for the possession of Eastern blood; and as this not only increased as time went on, but extended to other parts of the kingdom, a great improvement took place in our breed of horses. During the first three decades of that century a number of the following Eastern sires were brought into England, and located in different parts of the country, while the others were imported later, viz.:—

Arabians.—Alcock, Bethell, Basset, Bell's, Bloody Buttocks, Bloody-shouldered horse, Conyers, Chesterfield, Cullen, Coombe, Curwen's chestnut, Cyprus, Damascus, Devonshire, Darley, Fletcher, Godolphin, Gibson, Harpur, Hampton Court, Honeywood, Hill, Johnson's, Leeds, Lexington, Somerset, Sutton, Lonsdale, Lord Brook's, Sir W. Morgan's, Newcombe, Newton, Northumberland, Oglethorpe, Oxford Bloody-shouldered horse, Panton's, Portland, Pulleine, Richards, Stanyon, Sannach, Sedley, Wildrington, Thompson's Grey, Wilson's, Wilkinson, Woodstock, and Wynn.

Barbs.—Cole, Compton, Crapple, Croft's Bay, Curwen's Bay, Curwen's Gay Morocco, Hutton's Bay, Hutton's Grey, King William's Black, Lowther Bay, Lowther White-legged, Rider Chestnut, Rutland Black, Saint Victor, South, Tholouse, Taffolet, Vernon, and Wolseley.

Turks.—Akaster, Belgrade, Brownlow, Budlington, Byerly, Crawford, Ely, Faulkner Grey, Sir E. Hale's, Holderness, Lambert, Lister, Newcastle, Orford, Stamford, Strickland, Selaby, Shaftesbury, Turk (sire of Flanderkin), Wastell, and Williamson.

Others.—Duke of Rutland's Persian, Sir T. Gascoigne's foreign horse, and Sir Wm. Goring's foreign horse.

## How they Mixed.

Every one of these Eastern sires "did the State some service," but the blood of the Darley Arabian, the Godolphin Arabian, the Leeds Arabian, the Oglethorpe Arabian, Curwen's Bay Barb, the St. Victor Barb, the Compton Barb, the Lowther Bay Barb, the Taffolet Barb, the Akaster Turk, the Byerly Turk, and the Lister Turk is to be found in greater quantities in the pedigrees of the present day than that of their compeers. Nevertheless, there is no room to doubt it was owing to the crossing and recrossing of the whole of the foregoing Eastern sires, and the thorough amalgamation of their blood, that has given to Great Britain the finest breed of light horses in the world, and the descendants of whom are now to be found distinguishing themselves on the racecourse in every part of the globe.

*THE JOURNAL A GREAT HELP.*

*A Mount Fox farmer writes, 1st July, 1929:—"The Journal is a great help to us, as it contains the right information for the man on the farm. Ours is a mixed farm. I wish the Department every success."*

# RURAL LIFE IN OTHER LANDS—III.

By the EDITOR.*

We ended our last talk with some reference to the new levels of land utilisation in French agriculture during and immediately after the World War. We will now go on to consider some points in relation to size of farms, to type of farming, and later offer some more or less suggestive information on the possibilities of increasing our trade with France. Small properties have been the rule in France for centuries. The division of the land into very small holdings dates back to the enfranchisement of the country people some hundreds of years ago. It is a fairly common belief, or at least I have found it so, that the system of subdivision of farming lands into very small areas is a relic of the Napoleonic regime, but as a matter of fact, even under the feudal system, small holdings were farmed, and since that time the subdivision of land has continued. From time to time there has also been a counteracting movement, and great holdings such as Crown lands and the estates of the nobility have been consolidated.

## Areas and Tenure of French Farms.

To some extent, even in Australia we see evidence of this sort of reaction, where land that was originally cut up into small areas has become gradually part and parcel of large estates under various forms of tenure.

At the time of the Revolution of 1790, there were about 4,000,000 landowners in France, of whom the greater proportion, perhaps 80 per cent., were small farmers who owned something like 40 per cent. of the land. After the Revolution large holdings were split up and divided among landless farm labourers and holders of small areas little larger than what we would call allotments. From then on the number of peasant proprietors continued to increase until about forty years ago the rural holdings ranged in area from less than an acre up to, in rare cases, some hundreds of acres, and averaging a little more than 10 acres each. A vast number of holdings were less than 25 acres in size.

To-day, it often happens that several of these small holdings belonging to one owner are scattered round in different localities in different directions at different distances from the villages in which a vast majority of farmers live. And that is a peculiarity of French rural life, and nowhere else in my knocking about have I seen such a development of this communal or community instinct. The village with its Mairie or Town Hall, its Church and its Chateau is in most Departments the centre of community life. The people live in the villages and go backwards and forwards to their farms. There is less of that individualism that is such a marked characteristic of British people and other races of Northern Europe. Implements, machinery, and even draught horses are often community-owned on a co-operative basis. All the same, nothing will part the French peasant from personal ownership of his land, no matter how small the area may be.

## Pride of Ownership.

The great ambition of the rural worker in France, if he is not already a proprietor, is to own a bit of land. I also noticed this characteristic, this love of the land, very markedly evident in other European countries, and if their people are ever induced to migrate they carry this characteristic with them.

I remember once meeting a Swede, a new chum, in a country district in Queensland. He was slaving like a working bullock on double overtime on a bit of the hungriest, gravelly, ridgey, gum-topped box and spotted-gum country I have ever seen, and trying to make a farm out of it. Talking to him on his prospects, in his eyes one saw the pride of ownership, a pride that one was afterwards to see reflected even more brightly in the eyes of the small farmers of France and other Continental countries. He told me, and he was only a young man then, that when he left his homeland—Sweden—his one idea was to come to Australia where he might realise his life-long dream of owning ten acres, ten cows, and becoming a J.P. like his former employer in the old land. Out of the timber on his land he had hewn one of the neatest of slab houses—he was a sort of a Tommy Gorman with the broad axe—and all the fencing and other structures on his block were put into the ground to stand up and stay there.

* In a Radio Lecturette through 4QG.

I ventured to suggest that on the country he had selected there was little likelihood of his ever achieving his very modest ambition. Many months later I met him again with all his belongings piled on a German wagon with a well-worn single furrowed plough and set of harrows in tow behind the outfit. Those and two poorly-conditioned horses comprised all his worldly belongings. He had been compelled to abandon his hungry holding.

"Ey yove, Yack," he told me, "Ah baint beat yet, no by gum! Dot varm of mine—vot you call it?—vouldn't give bandicoot tucker mit. You remember dat oder varm, Yack, dad vas not von bit goot. De Devil he yump mit me and run mit me round der stomp. I chase him altogether alretty. But den I find dat all de time he chasin' me. Dot varm keep me poor and de Devil he keep me ver' mooch poorer, altogether yet so soon, but this time I vill yolly vell vin."

It was a new district, and forfeiting the one selection he had drawn another—as sweet a bit of alluvial river flat, backed by a wall of vine scrub that would fire the fancy of any farmer—and had just arrived on the new block. Though late in the afternoon, he unyoked, watered and fed his horses, yoked them up again to the plough and started in on a small stretch of clean, open country and kept going turning over the furrows while daylight lasted. Fired with the pride of ownership he eventually made that farm one of the best in the whole of that rich district. He more than realised his ambition, and when I saw him last he was milking, not ten, but a hundred cows, was chairman of the local butter factory, chairman of the shire, and a J.P. His energy, his love for his land, and his pride in its ownership were typical of the hardworking peasant proprietors of Europe. Queensland could do with many more like him.

**Love of the Land.**

The small farmers in France cling like a bank to a security in the possession of their land. The characteristics and producing capacity of each tiny field are known and family traditions have been built up as to methods of cultivation and caring for these little patches of country, the boundaries of which are often marked only by small white corner stones, suggestive of surveyor's pegs, and one straight separating furrow.

Naturally in these older countries habits, customs, and practices change very slowly, and in a French village, especially on market days, one can easily imagine oneself back in the Middle Ages.

Changes in ownership are not very frequent as in a new country like Queensland. All the traditions of the countryside are rooted in the soil, and holdings remain in the one family for generations.

**Changes in Ownership.**

It has been said that the subdivision of farming country became more frequent during the war, but it is probable that these reported changes were more "on paper" than real. Many cash-and-share renters had purchased, it was said, the lands they had previously cultivated because, in general, the price for agricultural products had increased more rapidly than had land values. But it is more probable that large holdings were purchased by merchants and manufacturers who had made large profits during the war than that these properties passed into the hands of peasants. The depreciation of the franc also rendered it possible for foreigners to acquire land more easily than natives of the same class, and a very considerable number of immigrants from other countries have settled on the soil of France.

There has been no sudden change in the system of land tenure comparable with the splitting up of the large estates of Russia and Roumania, and if more land has passed into the hands of the peasants since the war the movement has been a continuance of the tendency that has been in operation for more than a century.

France is a land of small farms well tilled. This fact goes a long way towards explaining how a country about one-fourteenth of the size of Australia is able to grow enough food to supply nearly all the requirements of a population nearly eight times as great.

**France's Food Supplies.**

And talking of food supplies, before the war France was practically self-sufficing with regard to meat supplies. It is estimated that foreign sources furnished but 2 per cent. of the total consumption. There was a deficiency in pork and pork

products and in mutton. The latter was largely made up by the importation of sheep from the French colony of Algeria. There was an exportable surplus of beef and cattle. During the war the import duties were removed and very large quantities of meat, especially beef, were imported by the Government for the army. After the war, as was to be expected, these large shipments declined. Some years later, however, the trend of imports took an upward turn and the quantities imported since have been steadily increasing. Through the necessity of eating imported frozen meat during the war, many people lost their prejudice against it and now continue to consume large quantities of this class of food.

Workers are now so much better paid relatively that they can afford a much greater proportion of meat in their diet. This increased use of frozen meats is in common with an increased consumption of such meats in western European countries. Before the war England took more than four-fifths of the world's chilled and frozen meat exports. With the continental markets becoming more important, the proportion of this type of meat taken by England was reduced to only two-thirds of the world's exports, the remainder being absorbed largely by continental European markets. France, since 1914, has usually been the most important continental importer of such meats, a fact of which possibly we in Australia might take more notice.

**Possibilities of Business for Australia.**

Coming to general conclusions from our very sketchy study of rural economic conditions in France, one has naturally had an idea of suggesting the possibilities of France as a market for Australia.

The tremendous losses of man power, the destruction of property, and the devastation of the soil itself have taxed the recuperative powers of France to the utmost. Yet during the interval of the comparatively few years since the armistice France has, unaided, practically completed the restoration of the ten devastated Departments. Hundreds of thousands of farms and dwellings have been re-equipped, and since 1923 industrial and commercial activity have given steady employment to all available labourers, and hundreds of thousands of workers have been recruited from neighbouring countries.

Employment at good wages has rendered possible the establishment of a higher standard of living in urban and industrial centres than has ever been before enjoyed among the masses of the French people. More wheat and more meat are in demand as well as better clothing and more luxuries. This fact is of great interest to the farmers of Australia, as is also the fact that more cereals are being consumed on farms, thus keeping from the markets certain supplies of food that now must be imported from abroad.

Before the World War agriculture was steadily losing its position of predominance in the national economic life of France. Field-crop production had been on the decline more than two decades and the country lands had been slowly going to grass. Live stock numbers had not increased proportionately to the greater available home-grown and imported forage and fodder supplies, but the live weights and quality of animals and the yield of milk had increased. The sale of live stock and animal products formed more than 70 per cent. of the farmer's income. France was practically independent of outside sources of meat supply, and had become an exporter of dairy products.

This situation was reached, as I have said in a previous talk, as the result of a series of adjustments to changes that had occurred in world agriculture. The world market became flooded with American cotton, and Australian wool, and the French farmer abandoned flax, hemp, and wool production and turned his attention to meat. Now the world market is being flooded with frozen meat, and the farmers of France are turning more and more to dairying.

The per capita consumption of meat, butter, milk, and wheat is increasing. France cannot meet the demand for increased supplies of animal products without abandoning still further the area under grain which, under the wasteful system of scattered land holdings, cannot be economically produced in competition with the broad acres and power farming of the newer countries like Australia. The possibilities of the French market, for our frozen and canned products particularly, is, in my opinion, well worthy of our attention.

# CARE OF THE CAR.

## THE WEEKLY OVERHAUL.*

Once having purchased the new car and got it safely home, the question naturally arises: How much care and attention is necessary when the vehicle is in frequent use, and what are the most important jobs which should be done, say, once a week, in order to maintain its efficiency? Various owners have various systems, but all no doubt agree that the most important jobs are those which centre in lubrication.

### Follow the Oiling Chart.

It cannot be urged too strongly that the oiling chart which is issued, or should be issued, with every instruction book is one of the most important documents which comes into the hands of the new owner-driver, and he should study it until he is familiar with every point on the car which needs attention. He should also know how often each one requires it.

To carry out the programme which is here suggested, at least two hours will be required, but as such tasks should devolve into labours of love they should not be looked upon as waste of time, and often the stipulated period is exceeded in the enthusiasm of the moment, which is all to the good.

### The Engine.

The first consideration should be the engine, and of prime importance is the level of the oil in the sump. It is preferable to ascertain this level after the engine has been running for a few minutes, rather than to withdraw the dipper rod when the oil is quite cold. In any case, it is not sufficient merely to withdraw the dipper rod, as the reading thus obtained may be erroneous owing to the influence of capillary attraction, which causes the oil level to show slightly higher on the rod than it actually is in the crankcase. The correct procedure is to wipe the rod quite clean and then take the reading.

On no account should the gauze filter be removed when adding fresh oil. On a cold morning it may mean that the lubricant will take some time to pass through the filter, but patience must be exercised, as it is essential that all impurities should be separated and trapped before the liquid enters the sump.

It is a mistake to oil a magneto or dynamo once a week. Actually these instruments require very little lubrication, and at fairly long intervals, but there is no harm in applying the spout of the oilcan to such parts as the throttle controls and advance and retard mechanism. It is a good plan also to inject oil on to the starting handle shaft bearing as the ingress or dust or dirt at this point frequently accounts for what is regarded as a stiff engine.

Whilst the engine is still exposed, the operator should make sure that the high-tension lead terminals, both on the magneto and plugs, are quite secure, and he should also examine the joint made by each plug with the cylinder head in order to make sure that there is no leakage which is leading to a loss of compression.

Should there be signs of partly burnt oil or oil bubbles round the joint, the plug must be tightened up slightly. Before replacing the engine bonnet make sure that the earth lead from the magneto is quite clear of metal parts, and especially those which warm up when the engine is running.

The writer invariably turns his attention next to steering connections. Even the shortest run over wet roads demonstrates the fact that these parts receive far more than their fair share of mud and water which is thrown up by the front wheels, and the object of lubricating the yoke ends and pivot pins weekly should be not only to provide the essential film of grease, but to force out grit and water which may be working their way in.

### The Front Axle.

Although it entails slightly more trouble, it is an excellent plan to jack up the front axle before commencing operations, so that both road wheels are clear of the ground. Each wheel in turn can be spun round so as to make sure that it is running freely, whilst there is the additional benefit that the loads on the steering pivot pins will be reversed, permitting lubricant to ooze freely over surfaces which normally are tightly pressed together.

During the weekly overhauls, which take place within the first few months of the life of a car, it is desirable to force through each bearing at least one complete greaser-full of lubricant, and if an assistant can be obtained he will lightly swing the steering wheel from one side to the other, whilst the first operator screws down each

*In the "Farmer and Settler."

greaser in turn. In this way the free circulation of the grease will be facilitated. Needless to say, if it has been decided to wash down the car, this should be done before the greasing is started.

The front axle should now be lowered again, and a choice of two methods of examining and lubricating the transmission presents itself. There is really only one main point which requires grease once a week, this being the clutch withdrawal mechanism, and the writer has found that it is almost as simple, and far quicker, to lie at full length under the car to do the job rather than to remove the floorboards.

Before passing to the rear of the car, it is a good plan to oil the change-speed gate, but, again, if unit construction with central control is adopted, the gearbox will look after itself. When the final drive is by an enclosed propeller shaft, the tubular casing taking the torque, the layout will require no attention, but if the shaft is of the open type, a triangular or other form of torque member being fitted, its anchorage to the chassis at the forward end may, and probably will, require periodical lubrication.

### The Back Axle.

In so far as the back axle is concerned, the main points which must be watched are the brake-cam spindles. As a general rule, screw-down greasers are provided, but these very soon become coated with mud and are liable to be overlooked. Usually they are in a rather inaccessible position, but this should make the owner-driver all the more careful to see that they receive their proper quota of grease.

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## THE FARM TRACTOR.

### BATTERY OPERATIONS.

By E. T. BROWN.*

It is commonly thought that the object of a battery is to store electricity. This is only true to a certain extent. The electrical energy that is passed into it when it is charged is converted into chemical energy. Chemical energy is reconverted into electrical energy when the current is tapped—that is, when it is being discharged. The active materials in this type of battery are lead oxide and spongy lead. The former is on the positive plates; the latter on the negative plates. These materials are held in suitable grids and immersed in a solution of pure sulphuric acid and distilled water. This acid solution, termed the electrolyte, consists normally of one part of acid to three or four parts of water. The plate grids are made with lugs to which the terminals are attached. The plates are contained in a sealed vessel.

The action that takes place can best be described by starting with a fully charged cell or battery. When current is taken therefrom a chemical action takes place. Some of the lead oxide on the positive plates and some of the spongy lead on the negative plates is converted into lead sulphate. This conversion causes water to be formed; hence the electrolyte in a discharged battery always has a lower density than that in a fully charged accumulator. During the discharge period only a small quantity of the lead oxide and the spongy lead is affected—that is, only a small proportion of the total quantity of the active materials present is involved in the change. When the battery is being charged, either from the dynamo in the case of a motor-car electric lighting and starting set, or from an outside source in the case of a battery used for driving the vehicle, the current is sent through in the reverse direction—namely, from the positive to the negative plates. The lead sulphate that was formed during the discharge is converted into lead oxide on the positive plates and into spongy lead on the negative ones. The density of the acid solution rises, since charging implies that the water formed during discharging is again converted into sulphuric acid.

### Charging the Lighting Battery.

When a farm tractor is fitted with an electric lighting set a dynamo is also installed. This form of electric generator is situated on a convenient part of the engine, and driven by a belt or chain from the valve and ignition gearing. The dynamo need not be described at this stage, but it may be mentioned that a device known as a cut out is incorporated, this breaking the circuit from the dynamo to the battery until such time as the current generated by the former possesses a higher voltage than the current stored in the battery. Were this device not employed the battery would discharge itself into the dynamo. The dynamo should be switched on to charge the tractor battery for an hour every day the machine is in use and at all times when the lamps are illuminated. This generally serves to keep the battery fully charged, unless the outfit be used solely at night, when occasionally the battery may have to be charged from an outside source.

*In the "Farmer and Settler."

*Photo.: Dept. of Public Instruction.*]

PLATE 71.—TRAVELLING MANUAL TRAINING SCHOOL—LEATHERWORK CLASS.

In Queensland, wherever possible, technical education is brought within reach of the country lad. This is an interior of a "School on Wheels." The wide service of the scheme can be appreciated when it is remembered that Queensland, with a population of fewer than a million people, has nearly 6,000 miles of railway.

*Photo.: Dept. of Public Instruction.*]

PLATE 72.—LEATHERWORK CLASS AT A RURAL SCHOOL.

In the centres of the more closely settled districts Rural Schools have been established in Queensland, and in these the mechanical aptitude of the young Queenslander is practically encouraged; and he learns the value of organised work as well as the elements of arts and crafts.

# PIG FARMERS' SCHOOL AT GATTON.

## ADDRESS BY THE PRESIDENT OF THE ROYAL NATIONAL ASSOCIATION.

SUBJOINED is a brief summary of an address delivered by Mr. Ernest Baynes, President of the Royal National Agricultural and Industrial Association of Queensland, to members of the 1929 School of Instruction for Pig Farmers at the Queensland Agricultural High School and College, Gatton, and which contains many points of interest. Mr. Baynes returned recently from a tour to South Africa and New Zealand, and the student farmers were given the benefit of his close observations of agricultural conditions and practice in those countries. His address was greatly appreciated. Summaries of other interesting lectures delivered at the same school will appear in the September issue.

### The Royal National Association.

The Royal National Association is intensely interested in the work of Queensland pig raisers who are establishing high standards in their important industry. The schedule of the Brisbane Show has set out the practical way in which the Association is assisting the pig breeders of the State, and much more is being done than that schedule indicates. New and commodious pavilions have been erected for housing this year's exhibits, and all necessary conveniences had been provided. In addition, sound educational work is being carried on in co-operation with the Department of Agriculture and Stock and the Agricultural College in the course of the year. The value of this activity may be appraised by studying the pork products section of this year's display in the Live Stock and Meat Industry Hall at the Brisbane Exhibition, which will provide a striking object lesson of the value of eliminating all waste and the utilisation of every by-product.

Plate 73.—The 1929 Pig School at Gatton College.

A yard lecture by Mr. A. J. Mackenzie, Instructor in Animal Husbandry, discussing the merits of various types of Berkshires used in the College Stud for stud-breeding purposes.

### The Country's Gift to the Nation.

Usually country people look to cities to supply the great citizens, thinking they are the product of the great Public Schools and Universities, but they are far from right. The great doers of Britain came from small towns and villages; Cromwell came from Huntingdon, Darwin from Shrewsbury, Nelson from a village; so did Cecil Rhodes, Hastings, and Clive. That fact was mentioned to show that residents of the country are not out of things.

Our idea of a good citizen is one whose life has made others wealthier, nobler, kindlier and happier—one who has in some way raised the standard of quality of human life; who has assisted the human race and raised human values.

Cecil Rhodes's idea of a scholar was a manly, efficient, and athletic man, a man cut out to be a leader of men, and with courage to take up national affairs.

In South Africa last year, the lecturer found evidences of Rhodes's great citizenship wherever he went. He was far from a saint, but yet a great man who understood mankind, he saw that this was the young man's age and hoped and wished them to take their place—hence the Rhodes scholars.

On the young men of to-day rests the future of this great Commonwealth, and if they did not want to be left behind in the world's competition they must strain every nerve to become efficient; and remember—nothing but the best is good enough.

### The Best is only Good Enough for Australia.

A few years ago, when opening the Townsville Show, the lecturer had stressed the necessity of the young men of this country eliminating from their vocabulary the words "good enough," and, co-incidentally, about a month after, the then Governor-General, Lord Forster, when opening the Brisbane Show, made the same remarks. No doubt, he also had noted a tendency among Australians to let things rip. There is no such thing as good enough, and if we wish and hope to retain a place in the world's markets we must remember nothing but the best is good enough for Australia and Australians. The slap dash idea or good enough is rather tempting, for it means travelling along the lines of least resistance, but that is only a slippery track for weaklings. The farmers of the countries of the old world, who have not the good fortune to be in such an easy country in which to live as Australia, have made the standard of their products very high. As an example, the Danes set the standard for butter on the highest level, and when that level was threatened by New Zealand and Australia they set about improving their methods. There was no "good enough" for them. Boiled down, the best simply means efficiency, and it does not matter whether it is butter, bacon, flour, or meat; nothing but the best will do.

### Conditions in South Africa.

In South Africa, the lecturer observed, the Freisian cattle are the most popular, and by concentrating on the breed the dairymen there had raised it to a very high level, and were actually sending large drafts of pedigree stock to England and the Continent, and making it pay. Country life there is far harder; for every one pest we have, they have ten, and they get droughts also. Africa is not as good as it looks, while Australia is better than it looks. But it has one great advantage over Australia—Capetown is only seventeen days from London; but in spite of that advantage farmers in South Africa, speaking generally, have a very poor time, and if it were not for coloured labour could not live.

After being in South Africa and studying conditions there, the lecturer said he is more convinced than ever that the ideal of a White Australia is the right one.

In South Africa the Government spent large sums of money on agricultural and pastoral education, and has a number of excellent agricultural colleges well equipped for research work—which is most necessary when one considers all their animal and plant pests. Africa is fortunate in having a great number of rich public-spirited men; men though they may live abroad do not forget what they owe to South Africa and richly endow all sorts of institutions.

### "Cheque Book Farmers."

The lecturer met some of these men, they are called "cheque book farmers," who maintain valuable studs of horses, cattle, and sheep; men who import high price stock, irrespective of cost, and distribute the progeny at very moderate prices. These men do a great national service.

The improvement of their beef cattle is a very difficult matter, for the natives—Zulus and other powerful tribes—are big cattle owners who do not care about quality, numbers are what they want.

### New Zealand's High Standards.

In New Zealand he found a very different country—a most highly cultivated one—a country of intensive cultivation where every acre on the farm is made to pay. It would be difficult to say what they carry per acre, but they have got the price of land too high, and as the holdings are small the sons of the owners are looking to Queensland; and with a little useful advertising we would get quite a number of young farmers with some capital to settle in Queensland. We do not want any more people in the towns, the country is calling for them.

The lecturer said that he did not know any country where there is a finer public spirit than in New Zealand. Go where you will you will find parks and institutions, all either dedicated to the public, or richly endowed by wealthy men who have done well out of the country. They, too, have some excellent State farms, but strangely enough no Agricultural High Schools similar to the one at Gatton.

Concluding, the lecturer said that he believed the greatest message he could leave with his hearers was that they return to their farms with a strong intention of doing bigger and better work in the pig-raising business, and while they had to look to their own livelihood let them remember the great national value of the work in which they were engaged. Let them do that work thoroughly and in accordance with the high ideals with which any great national service is inspired and guided.

PLATE 74.

THE OLDEST AND THE YOUNGEST STUDENT AT THE 1929 PIG FARMERS' SCHOOL OF INSTRUCTION AT GATTON.

Mr. E. Hill, of Beaudesert, and Master Arthur Mills, Gilston School Pig Club, Nanango.

PLATE 75.—THE 1929 PIG FARMERS' SCHOOL OF INSTRUCTION.

Farmers, Students, and Officials on a visit to the Metropolitan Bacon Factories as guests of the Queensland Bacon Curers' Association.

Plate 76.—A Yard Lecture at the Pig Farmers' School, Gatton College, June, 1928.

The Instructor in Pig Raising (Mr. Shelton) is discussing the merits of the Duroc-Jersey sow, used at the College in crossbreeding experiments.

Plate 77.—Work is their Hobby.

The Staff at the Piggery at Gatton College who assisted in arranging the several demonstrations and whose services were available throughout the School term. On the right is Mr. H. Severns, the venerable "Pig Man," who has looked after the College Piggery for many years and has worked under several Principals.

## OBITUARY.

### THE LATE COMTE GONTRAN DE TOURNOUER.

The death occurred in St. Martin's Hospital on the night of 13th July of Comte Gontran Louis de Tournouer, B. Litt. (Sorb. Paris), Chevalier of Agricultural Merit, Officer d'Academie, and Librarian of the Department of Agriculture and Stock.

Although he was a notable Frenchman, coming from one of the oldest noble families of Brittany, the late Comte de Tournouer also qualified both in his service with the Australian Imperial Force in the Great War and in his private life in Queensland to the title of a good Australian.

Primarily interested in agriculture he possessed great literary attainments and his ability as a linguist—he could speak fluently every European language as well as Arabic—aided him greatly both in military and civil life. His father and two of his brothers fell fighting for France, each winning high distinction on the battlefield.

Comte de Tournouer was born at Pontivy, Brittany, on 27th August, 1885. He was educated in Paris and graduated in literature at the Sorbonne University. He was about to enter St. Cyr Military Academy when the fortunes of his family suddenly changed and he came to Australia to start life afresh. Going on the land he became engaged in sugar-growing and pastoral pursuits in the Wide Bay district. Later, he joined the Commonwealth Public Service, afterwards transferring to the State Service. He was on the staff of the Government Savings Bank when war broke out in 1914. He enlisted in the Australian Imperial Force for active service overseas on 17th August of that year. He embarked with the Australian Light Horse and saw service with that formation and the Camel Corps on the Eastern fronts; and transferred later to the Fourth Australian Divisional Artillery, and with that unit he was able to return to his native land as a Digger fighting in its defence. Invalided back to Queensland after meritorious field service he was appointed to the Military Censor Staff in Brisbane. After the Armistice he returned to the State Savings Bank and on the merging of some of the activities of that institution with those of the Commonwealth Bank he remained with the Advances to Settlers Board, and in October, 1922, was transferred to the Department of Agriculture and Stock.

In recognition of his services to General Pau's Australian Mission and other useful offices he was awarded by the French Government the honour of Chevalier of Agricultural Merit and Officier d'Academie. Sometime president of the Alliance Francaise in Brisbane, he was afterwards its vice-patron.

He was an able contributor to French and other periodicals on Australian life and agricultural and kindred subjects. On the lighter side of journalism he supplied much prose and verse, and occasionally topical cartoons, to the daily and weekly press, including the Sydney "Bulletin." He was endowed with a nimble and versatile pen—the ever busy tool of a gift of ready expression, of racy anecdote, of whimsical and often piquant humour and other attributes of a well stored mind. This happy combination

PLATE 78.

THE LATE COMTE GONTRAN DE TOURNOUER, B. Litt (Sorb.), Chev. Merite Agric., O.A.

of gifts was unusual, but his learning always sat lightly upon him. With equal zest he browsed in the past and in the present; his mind flitted from antiquity to ultra-modernity, and he was ever ready to enter the lists of current and ephemeral controversy. Ethnology was one of his hobbies.

As a lightning sketch artist he was always in demand at gatherings of ex-A.I.F. men. A member of the Returned Sailors and Soldiers' Imperial League of Australia he rendered much unobtrusive service to old comrades —sometime of "the toughest veterans in Normandy," who were crocked in the war and to whom he was bound by a common link of suffering and whose lives he sought to brighten and lighten. In this service he forgot his own great physical disabilities—painful legacies of hard campaigning which hastened his own untimely and intensely regretted end. In his last illness he exhibited remarkable cheerfulness, fortitude, and courage. A widow and small daughter survive him, and to them deep sympathy is extended.

At St. John's Cathedral, on Monday, 15th July, a brief and most impressive service was held at which an old friend, the Rev. D. Morgan Jones, officiated and paid a touching tribute to the late Count's character, his gifts of mind and personal charm. The Union Jack and Tricolor draped the casket and on it rested a wreath of poppies.

That morning the late Comte de Tournoner was laid to rest in our own war cemetery at Toowong where the shadow of the Cross of Sacrifice falls athwart the Stone of Remembrance and as evening deepens extends across the Diggers' graves.

"He sleeps as in his dug-out yesternight,
With an old friend in reach on either hand;
God has the jewel, the courteous soul of him;
The dust that cased it lies till wars are done."

The Rev. Mr. Morgan Jones read the simple and beautiful burial service, and the sorrowing gathering at the graveside included Major H. R. Carter (Consular Agent for France), Messrs. E. Griffith Oxley (president), F. O'Sullivan (secretary), Leon Burguez, R. Beardmore, H. Tardent, Mrs. Campbell Brown, Madame Rochat, and Madame Tardent, representing the Alliance Francaise; Messrs. W. C. Warne (secretary) and W. C. Thompson (vice-president), representing the Limbless Soldiers' Association; Major H. Maddock and Mr. A. Rees, representing the Brisbane sub-branch of the Returned Sailors and Soldiers' Imperial League of Australia; Mr. J. H. Holliday (secretary), representing the State Branch of the R.S.S.I.L.A.; Messrs. R. Wilson (Assistant Under Secretary), G. Williams, H. Collard, and H. G. Crofts (Fruit Branch), H. C. Quodling, A. E. Gibson, C. S. Clydesdale, H. S. Hunter, and S. Burchill (Agricultural Branch), Lieut. J. F. Reid (Editor of Publications), Messrs. R. Veitch and J. A. Weddell (Entomological Branch), R. W. Peters (Cotton Section), G. R. Patten (Agricultural Chemist's Branch), R. B. Morwood (Plant Pathological Branch), H. S. Iliff and A. McGown (Stock Branch), M. L. Cameron (Dairy Branch), R. J. Holdsworth (Seeds Branch), A. A. Salmon (Accounts Branch), J. P. Orr (Registrar of Co-operative Associations), and J. Black (Commercial Section), representing the Department of Agriculture and Stock; Colonel Ray Stanley (Government Analyst's Branch), Dr. J. V. Duhig, Mr. T. C. Troedson and Dr. E. A. von Schulze (representing the Intelligence and Tourist Bureau); Mr. Arthur Avins and Lieut. G. Zucksweerdt.

# Answers to Correspondents.

## To Soften Greenhide.

J.E.H. (Mapleton)—

After de-hairing the calf skins in a solution of lime water, as you have already done, soak them thoroughly in kerosene, and afterwards apply vigorously any form of grease, provided it does not contain any salt.

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## Stomach Worms in Sheep.

P.K.C. (Dalby)—The Senior Instructor in Sheep and Wool (Mr. J. Carew) advises as follows:

Regarding stomach worms in sheep, from practical experience I have found the arsenic and Epsom salts very satisfactory, especially when changed every third or fourth drench to bluestone and mustard. Leaflets on both of these drenches have been posted. Besides these I found that through drenching the same flock of sheep year after year many sheep take more dosing to keep them healthy than others, consequently individual treatment suggested itself with the result that certain sheep (breeding ewes) were marked for identification, and these were selected owing to their condition not improving. With these I increased the dose, and in some cases I doubled the dose before getting satisfactory results, and I am convinced that the worse the sheep is from stomach worm infestation the more arsenic they will stand, and further, that it takes more to dispel the worms, for in heavily infested sheep they become anaemic, showing swellings under the jaws. They also get a craving for water and consequently the fourth stomach where the *Strongylus contortus* is located contains more liquid than is usually found in a healthy sheep.

The benefit of changing to the bluestone and mustard every third or fourth drench will be reflected in the sheep. Dr. Clunies Ross, who has been conducting experiments in Central Queensland with carbon tetrachloride, reports that the most effective treatment known at the present time for stomach worm infestation in Australia is the use of carbon tetrachloride, a drug which is also of great value in treating liver fluke infestation. He states that less effective than this is bluestone (copper sulphate), but this drug has the advantage that it is cheaper, easily administered, and very safe. The object of the medicinal treatment of sheep is not only to cure them of the effect of worm infestation, but secondly, and more important perhaps, to kill the worms in them so that they can no longer produce eggs to contaminate the pastures further. He further states in practice, however, this is not practicable under Australian conditions:—(i.) Because there is no drug known which can be guaranteed to kill every worm and (ii.) because in many instances it is impossible to drench all sheep every three or four weeks throughout the spring, summer, and autumn months. It is possible, however, to reduce losses from worms to a minimum and to convert what is unsound country because of worms into payable sheep country.

Treatment with carbon tetrachloride is given in the following doses:—

*Lambs*, 1 cubic centimetre or 17 drops;

*Adult sheep*, 2 cubic centimetres or 34 drops.

Owing to the small size of the dose the drug must be given in such a way that none of it is lost. It may be administered conveniently (*a*) in gelatine capsules of 1 cc. or 2 cc. size, or (*b*) mixed with four parts of liquid paraffin—making a dose of 5 cc. for lambs and 10 cc. for adult sheep.

*Before treatment.*—The sheep should be yarded overnight and dosed on the following morning before being allowed food and water. They may be allowed food as soon as they have been treated with this drug. When administering capsules it is best to use a small balling gun, which can readily be made by taking a piece of stiff rubber tubing approximately 9 in. in length, with an internal diameter of ½ in. A plunger of cane or wood should be smoothed down so that it runs easily in the barrel, and

should be sufficiently long to form a handle on which a guard should be fixed to allow the plunger to be driven home to ⅛ in. from the end of tubing.

The operator stands in front of the sheep, the catcher opens the mouth by grasping both upper and lower jaws, the barrel is inserted and pushed backwards over the base of the tongue, and the plunger driven home to expel capsule.

*Administering the liquid.*—When the liquid is used it should be given by means of a metal syringe holding exactly 5 or 10 cc., according to whether lambs or adults are to be dosed, and fitted with a long slightly curved nozzle. The syringe is filled with the liquid, the nozzle inserted over the sheep's tongue, and the syringe emptied steadily. Owing to the fact that carbon tetrachloride evaporates quickly, only a small quantity at a time should be poured from the container into the vessel from which the liquid is filled. The ingredients for the copper sulphate drench are—Bluestone, 8 oz.; water, 3 gallons. Dose for adult sheep, 2 fluid oz.; for 2-tooths, 1½ fluid oz.; lambs, 6 to 12 months, 1 oz.; lambs, 3 to 6 months, ½ oz.—which is stronger than the dose recommended by this Department, minus mustard.

A plan of treatment that would last over the year is also given as follows:—

(i.) All sheep to be treated in July. The degree of infestation both in sheep and pasture is at its lowest at the end of winter, owing to the fact that cold is unfavourable to the development of eggs and young worms. If thorough treatment of all sheep is carried out at this time the great majority of all worms will be killed, so that on the event of the warmer weather in the spring, when development becomes more rapid, few eggs will be passing out on the pasture.

(ii.) All young sheep and lambing ewes and if possible all sheep to be treated in September. Treatment at this time will again decrease the output of eggs.

(iii.) Treatment of young sheep and lambing ewes must be repeated at monthly intervals from November to May.

(iv.) All aged sheep other than ewes in lamb should receive at least two drenchings during the worst summer months. Though all aged sheep receive at least two treatments in January and March it is preferable, where only small numbers of sheep are to be drenched, for all sheep irrespective of age to be given the monthly drenchings from November to April.

*Preventive Measures.*—(i.) Burning-off paddocks. (ii.) Protection of young sheep. (iii.) Heavy stocking to be avoided. (iv.) The use of licks.

In conclusion, Dr. C. Ross wishes to urge the necessity for sustained action in any effort to control worm infestation. He writes it is by no means an easy problem, and there is no sovereign remedy which is both very cheap, easy to apply and thoroughly effective. Stockowners must realise that the solution of this problem will depend on the thorough application of not only one but all the measures outlined, but they may be assured that success will more than repay all the money and energy expended. In connection with licks, there are many on the market which are registered and carry the maker's guarantee.

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## FRUIT GROWING.

### Winter Watering of Apricots.

H.G.H. (Wondecla)—

The Director of Fruit Culture (Mr. Geo. Williams) advises that there is no occasion to water apricots during the winter months. Light watering just before they come into growth would assist in stimulating the tree generally, and a further supply after the fruit has set would also be beneficial. The hidebound condition of bark suggests that the position is uncongenial, and a dressing of complete fertiliser prior to spring growth is recommended.

## BOTANY.

*(Replies selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.)*

### *Panicum gracile.*

J.L.W. (Chinchilla)—

Your specimen of grass is *Panicum gracile,* fairly common in Queensland and New South Wales, and ranging from the coast to the interior. It grows in a variety of situations, and in better class soil in the West is fairly drought-resistant. It is relished by stock, and has a fairly high nutritive value. Most of the native Panick grasses are very useful in the general mixed pasture. We have not heard of a common name applied to it, but it has been referred to in several works on Australian grasses as the "Slender Panick Grass."

### "Crane Bill" or "Native Carrot"; "Potato Bush."

E.J.T. (Charleville)—

The small plant with hairy leaves is a young growth of some plant of Geraniaceæ, I think *Erodium cygnorum,* the "Crane Bill," generally regarded as a good fodder, and known in Western Queensland as Geranium or "Native Carrot." The latter name is, however, applied to quite a number of different plants.

The other plant with berries is *Solanum Sturtianum,* a species of "Potato Bush," fairly common in parts of Western Queensland and New South Wales. In the latter State, feeding experiments have proved the plant to be poisonous. The symptoms, as outlined by the investigators (Dr. H. R. Seddon and Mr. H. R. Carne), have been described as follows:—

1. The eating of the berries by stock leads to a fatal hæmorragic inflammation of the stomach and intestines.

2. Symptoms of illness are not manifested for a day or more after taking the parts and the first notice is that the animal becomes markedly depressed. Soon violent diarrhoea ensues and this leads to a marked weakness and wasting. Death usually occurs in from two to three days, though animals may linger longer. Other symptoms noticed were frothing at the mouth and slow breathing.

3. On post-mortem examination a most marked change was seen in the stomach and intestines. In this the lining membrane is dark red, and may be soft and tarry-looking. Blood and mucus are mixed with the bowel contents.

### Tie Bush.

A.W.A. (Gympie)—

Your specimen is *Wickstroemia indica,* the "Tie Bush." The local name is applied on account of the fibrous nature of the bark. It has been suspected of poisoning stock on several occasions, but feeding experiments with it, conducted at the Stock Experiment Station, Yeerongpilly, some few years ago, show it to have very little ill effect on cattle. It is very hard to get cattle to eat it, and after about a fortnight's feeding, the animals become very emaciated, weak, and rather constipated, but no other ill effects follow, and it is doubtful if paddock stock would eat sufficient of the plant to cause trouble.

### Asthma Weed—Rosemary.

M.C. (Lota)—

The Asthma Weed (*Euphorbia pilulifera*), is very common at certain times of the year in the neighbourhoor of Brisbane, particularly favouring edges of cultivation paddocks, and the ballast along railway lines. In fact, in a walk along any railway line in the neighbourhood of Brisbane during the summer months, you will see plenty of Asthma Weed, which is a reddish plant covered for the most part with small hairs, and exudes milky juice when cut or broken.

Rosemary does not grow wild in Queensland, though it may be seen in gardens. If you cannot get it from the local nurserymen I might mention that plants are sold in some of the Southern States, for instance by Messrs. Hazelwood Brothers, Epping, New South Wales, at 1s. 6d. each.

**Plants Identified.**

T.H.B. (East Barron, via Atherton)—Your specimens are:—

1. *Sida cordifolia*, the Flannel Weed, of Family Malvaceae, a common weed widely spread over the tropical regions of the world and very common in North Queensland.
2. *Ageratum conyzoides*, a native of Mexico and tropical America, very common as a weed in most tropical countries. It was introduced into Australia as a garden plant, and as a matter of fact is still planted extensively in the Southern States as a bedding plant, the cultivated forms however being somewhat more compact than the wild one. In Queensland it is most familiarly known as "Billy Goat Weed."
3. *Cenchrus australis*, Hillside Burr Grass, or Scrub Burr Grass, a native grass commonly known in Queensland by the absurd name of "Scotchmen's Lice."
4. *Antigonon loptopus*, a native of Mexico and Southern America, and commonly known abroad as "Mountain Rose" or "Loves Chain"; in Queensland, however, it is known by its botanical name. It belongs to the family Polygonaceae.
5. *Angelonia sp.*, family Scrophulariaceae. We have had this plant in the Botanic Gardens, Brisbane, for some years, and it has always gone under the name of *Angelonia floribunda*, a native of Mexico, but we are not absolutely sure of the specific name being correct.

**Central Western Plants Identified.**

A.M.McL. (Springsure)—Your specimens are:—

D.D. *Eremophila maculata*, Fuchsia Bush, family *Myoporaceae*.

E.E. *Myoporum deserti*, Ellangowan Poison Bush, family *Myoporaceae*.

F.F. *Gnaphalium luteo-album*, Cudweed, family *Compositae*.

G.G. *Abutilon sp.*, family *Malvaceae*. Specimen too small for specific determination.

H.H. *Acacia excelsa*, Ironwood Wattle, family *Leguminosae*.

I.I. *Loranthus exocarpi*, a species of Mistletoe, family *Loranthaceae*.

J.J. *Petalostigma quadriloculare*, Quinine Berry, family *Euphorbiaceae*.

K.K. *Alphitonia excelsa*, Red Ash, family *Rhamnaceae*. Generally regarded as a very useful fodder tree.

L.L. *Solanum sp.* A species of Potato Bush, family *Solanaceae*. Members of comparatively large genera such as Solanum and Abutilon, in which many of the species are alike and not clearly defined, are often impossible to name specifically from small pieces.

**Knotted Clover.**

R.J.G. (Kinleymore, Preston Line)—

The plant is a species of Clover or Trefoil, but these plants are very hard to determine specifically before the flowering stage. We have spent some little time on your specimen however, and should say it is *Trifolium striatum*, the Knotted Clover, a native of Europe, naturalised in the Southern States, but not previously met with in Queensland, and we should say your plant was evidently introduced with Southern seed. The plant is of annual duration, but during the winter and early spring months gives a fair amount of nutritous fodder. If the plant flowers with you later, we should be glad of a specimen to verify the determination.

**Black Mauritius Bean.**

E.M.C. (Mackay)—

Your specimen is *Stizolobium aterrimum*, commonly known in Queensland as the "Black Mauritius Bean," and largely grown in some places as a green manure, particularly for cane. It is sometimes known in Queensland as the "Florida Velvet Bean," but the true "Velvet Bean" is a somewhat different plant. Though the "Black Mauritius Bean" is very widely cultivated in tropical countries, the beans seem never to be used for food. Allied species have been tried, but though the flavour was not unpleasant, they were found to cause purging and vomiting if eaten in ordinary quantities.

### A Native Species of Passion Vine.

W.L. (Traveston, N.C. Line)—

Your specimen is *Passiflora Herbertiana*, a native species of Passion Vine. Both the leaves and fruits contain a prussic-acid-yielding glucoside, and if eaten in quantity would act on stock in much the same way as young sorghum and similar plants, death being very rapid.

### Caustic Creeper.

INQUIRER (Brisbane)—

The specimens forwarded from Evesham Station, near Longreach, have been determined as follows:—The smaller leafed kind is the Caustic Creeper *Euphorbia Drummondii*, commonly known in Queensland by its botanical name. This plant is very widely spread in Australia, and reports about its poisonous properties are very conflicting. In New South Wales tests have found the plant to frequently contain a prussic-acid-yielding glucoside, the plant causing trouble in somewhat the same way as young Sorghum, death being very rapid. Numerous tests, however, have been made with the Queensland-grown plants of the same species, and the poisoning sometimes found was distinct from that of prussic-acid poisoning. In the more serious cases the most characteristic feature is stated to be a swelling which then exudes a clear amber-coloured liquid. The head and face then appear as if they had been badly burnt, but the sheep usually recover.

The other plant is another species of Euphorbia, namely *Euphorbia eremophila*, commonly known in Queensland as the "Bottle Tree Caustic." This plant is widely spread over the Australian States, going from Eastern Australia right over to Western Australia. Where it grows it is generally regarded as poisonous.

### "Cunjeboi."

S.W. (Brisbane)—

The specimen forwarded with your letter of even date is *Alocasia macrorrhiza*, commonly known in Queensland as "Cunjeboi." This plant contains in its tissues a considerable number of rhaphoides of calcium oxalate. These are contained in small capsules, which become ruptured when the plant is chewed, with the consequence that they enter the tender parts of the mouth and cause intense pain. It belongs to the family Araceas, and this is a property that occurs more or less through the family. The roots, however, after cooking are quite edible, as for example in the well-known "Taro" and "Dasheen," both very closely allied to the "Cunjeboi."

### Guinea Grass.

D.S.McN. (Nambour)—

The specimen forwarded by you is Guinea Grass, *Panicum maximum*. As the name implies, it is a native of Guinea in tropical Africa, but is now widely spread throughout all the tropical and subtropical regions of the world. It is a tall growing grass, forming large tufts of leafy forage, which makes a change from the common Paspalum and Rhodes grass. It is a drought-resistant grass and is adapted not only for feeding but also for chaffing and ensilage. Though the grass has been reported on favourably, it never seems to have taken on extensively. Along the North Coast line it is most abundantly seen as a weed in cultivation, particularly of orchards.

### *Paspalum platycaule*—Carpet Grass.

R.M. (Mooloolah)—

*Paspalum platycaule*, or Carpet Grass, is a native of the warmer parts of America, but now widely spread over the tropical regions of the world. It is very common in North Queensland and less so in the south. It has rather a mixed reputation as a fodder, but seems to be a useful grass for growing in poorer soils than those in which the ordinary Paspalum will thrive. It is very similar to, and has been confused with the smaller grass, Paspalum or *Axonopus compressus*. This has somewhat narrow leaves, and is considered a better fodder. You could, perhaps, employ it for smothering out the *platycaule*.

### Figs and Other Queensland Plants.

B.F.K. (Teneriffe, Brisbane)—

1. Is the name Brachychiton to be preferred to Sterculia? We think so. The only true Sterculia would then be *S. quadrifida*. If you are publishing notes on the timbers, however, we would advise you to use both names, giving one of them in brackets.

2. What is the distribution of *Erythrina vespertilio*. From the coast right to the far interior, travelling into Central Australia. It goes along the whole range of the coast at least as far north as Cooktown and then along to the Northern Territory.

3. What is the range of *Erythrina indica?* Mostly the islands of Torres Strait, and in coastal localities as far south as Bowen, growing practically on the sea beach. It has been recorded from Tallegalla by the late F. M. Bailey. This last is rather an isolated locality.

4. In what parts of Southern Queensland has *Embothrium Wickhami* or a variety of it been recorded? The normal form is confined to North Queensland, but a variety, *var. pinnata*, occurs on the mountain ranges of south-eastern Queensland, the only two localities we know being Lamington National Park, and Springbrook. The same variety grows on the Warrego in New South Wales.

5. The distribution of the six principal Figs? This is rather hard to give, but we should say the following are among the commonest Queensland Figs:—

   *Ficus macrophylla*, the Moreton Bay Fig, mostly in the south, but in a few isolated localities as far north as Bowen.

   *F. Watkinsiana*, almost the commonest fig in the rain-forests or scrubs of south-eastern Queensland. It is very common on the ranges in the South, on the Bunya Mountains, and at Kin Kin.

   *F. Cunninghamii*, along the whole coast, trees attaining a very large size.

   *F. platypoda*, common along the whole coastal country, often in the open forest.

   *F. pleurocarpa*, common everywhere on the Atherton Tableland.

   *F. colossa*, Northern Queensland. The big tree you see in so many photographs of Northern Queensland is supposed to represent this species.

   *F. glomerata*, very common along the rivers from the Wide Bay district to the Gulf Country.

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## PIG RAISING.

*(Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.)*

### The Best Bacon Pig.

W.J.S. (Inglewood)—

The question as to the most suitable breed of pig is largely a matter of personal opinion, for practically every breeder has his own fancy, and the bacon factories have not definitely stated which type they prefer.

A series of experiments are in progress at the Gatton College in which representative pigs of various breeds are being crossed for the production of pure and cross-bred pigs, the objective being the production of the most suitable type of bacon pig. Special features being emphasised in these experiments are, prolificacy, early maturity, suitability for market requirements and economy in production.

The Poland-China pig appears to be a very useful type for the production of pork and bacon pigs, particularly when it is crossed with a more lengthy breed like the Tamworth and similar types. We would not recommend the breeding of purebred Poland-Chinas for bacon production, for the reason that the crossbred pig appears to give better results. The same may be said with regard to the Duroc-Jersey, although no doubt it would be possible to produce a purebred animal in this breed suitable for market requirements.

The Berkshire has been a very popular type for many years, and during recent years the Tamworth crossed with the Berkshire has been a very popular one. The Berkshire-Yorkshire cross is also a particularly good one, particularly for the production of porkers or bacon pigs where the conditions are specially suitable, and there is no doubt that there are many advantages to be obtained in the use of the cross by using a Yorkshire boar.

Prices for stud pigs can be usually based on a valuation of approximately one guinea per month, starting at about four guineas at three months to approximately twelve guineas or so as yearlings.

Specially selected boars or extra good quality sows in-pig would, of course, be higher than inferior quality stock. We believe in better quality pigs, and strongly recommend breeders to secure the very best it is possible to obtain in the breeds in which they are interested.

## IS THIS A JERSEY RECORD?

From the English Jersey Cattle Society, 19, Bloomsbury Square, London, W.C.1, come particulars referring to the cow Rosemary. Her last calf was born 25th April, 1926, and up to 25th April, 1929, she has given 23,670¾ lb. of milk, and was then still giving 10 lb. of milk per day. Her last butterfat test was—evening 6.2 per cent., morning 5.45 per cent.

Owned and bred by Mrs. H. E. Jerome, Pittern Hill House, Kineton, Warwickshire, she was born 1st July, 1914, and has had eleven calves, ten of which are heifers.

Her weight is only 8 cwt. 14 lb., so that in three years she has given more than twenty-six times her own weight in milk with the one calf, and still giving a gallon of milk a day.

The English Jersey Cattle Society asks if this is a record.

## PHYSIOLOGY OF MILK PRODUCTION.

Recent research has thrown much light on the physiology of the act of milking, on which subject some varying theories were previously entertained. An American authority, writing in the "Guernsey Breeders' Journal," states that as soon as the milking act begins a small quantity of milk is removed from the cistern and larger ducts. There then follows a short period when only a small quantity of milk can be obtained. Soon there seems to be a great inflowing of milk into the udder. One says that the cow has "let down" her milk, or that the milk has "poured in." It is this reaction that has caused many to come to the conclusion that milk secretion goes on at a rapid rate during the act of milking.

In addition to the manipulation of the teats at the beginning of milking there are other types of stimuli which cause some animals to let down their milk. There is apparently considerable variation, and animals once becoming accustomed to certain types of stimuli react more quickly to that and sometimes will not respond to the ordinary causes. This factor undoubtedly is extremely important with large producing cows, and explains why some feeders and milkers get much better results from certain cows than others.

It has been found unnecessary to remove the milk to produce the effect described. The sight of the calf, the manipulation of the teats and massaging of the udder, or the swinging of the udder during a long walk from pasture produces the same effect. It seems evident, therefore, that the reaction is not due to a simple release of pressure in the udder. It seems very probable that it is a nervous reaction. This idea is further substantiated by the reaction of some cows to other types of sensory stimuli, such as the noise of milk pails and other dairy equipment. The noise of the milking machine will also cause these phenomena. Some cows will respond only to feed, and unless fed at milking time will "hold up" their milk. The "letting down" of milk may also appear spontaneously when the interval between milking is increased. It is said, however, that the process is more gradual under these circumstances.

The time that passes from the moment of the stimulation to the "letting down" of the milk varies with individuals between one-fourth and two minutes. It is thought that fresh cows react quicker and more clearly. A noted authority states that not every stimuli applied to the teat will cause the reaction. Stimulation with a needle or an electric current was without effect.

# General Notes.

### Protection of the Large Spotted Opossum.

An Order in Council has been passed providing for the total protection of the Large Spotted Opossum or Cuscus (*Phalanger maculatus*).

### Aliens and the Sugar Industry.

A regulation has now been passed whereby any person engaged in any phase of the sugar industry who employs therein any alien to whom "*The Sugar Cultivation Act of* 1913" applies, must furnish to the Under Secretary, Department of Agriculture and Stock, on the 31st December in each year, a statement in respect of such employees. Any person who is guilty of any contravention of this regulation shall be liable to a penalty not exceeding ten pounds.

### Registration Envelopes.

The Postal Department invites attention to the fact that, in order to meet the convenience of persons and firms who would find use for registration envelopes of foolscap size, it has introduced an envelope 9 inches by 4 inches, manufactured of stout paper, and eminently suitable for the transmission of legal documents. The price of the envelope, which is impressed with postage to the value of 4½d., is the same as that charged for the smaller registration envelope—namely, 5½d.

### Staff Changes and Appointments.

Constable J. E. Linnane, Merinda, has been appointed Inspector of Slaughter-houses.

Mr. W. W. Farquhar, Shire Clerk at Eidsvold, has been appointed Officer under and for the purposes of the Animals and Birds Acts, in the room of Mr. R. Farquhar, deceased.

Messrs. J. Legg, D.V.Sc., M.R.C.V.S. (Townsville), E. C. Lake (Mareeba), and D. A. Logan (Mackay) have been appointed Collectors of Royalty for the purposes of the Animals and Birds Acts.

Mr. J. L. Froggatt, Department of Agriculture and Stock, has resigned his position as Entomologist as from the 14th August, 1929. Mr. Froggatt is taking up the position of Entomologist to the Territory of New Guinea.

The appointment of Mr. G. P. Randles, of Zillmere, as an Inspector of Slaughter-houses, has been confirmed as from the 21st January, 1929.

The appointment of Mr. Thomas Douglas, Kingaroy, as an Inspector under "*The Diseases in Stock Act of* 1915" has been confirmed as from the 4th January, 1929.

The appointment of Mr. K. King, Cooran, as an Inspector under the Diseases in Plants Acts has been confirmed as from the 23rd January, 1929.

Mr. S. R. C. Harding, Manager of Westgrove Station, has been appointed an officer under and for the purposes of the Animals and Birds Acts.

Mr. W. S. Waugh, of Dalby, has resigned his position as Acting Inspector under "*The Diseases in Stock Act of* 1915" as from the 31st July, 1929.

Mr. J. W. Thompson, of Mayne Junction, has been appointed an honorary officer under and for the purposes of the Animals and Birds Acts.

Mr. B. Dunbavand, Inspector of Slaughter-houses, Ingham, has been appointed also an Inspector under and for the purposes of the Diseases in Stock Act.

On account of ill-health, Mr. W. S. Harding, Inspector of Dairies, Rosewood, has been retired from the Public Service as from the 21st June, 1929.

Mr. Kenneth McL. Gordon has been appointed an Inspector on probation, Agricultural Bank.

The following have been appointed Honorary Inspectors under and for the purposes of the Diseases in Plants Acts:—Messrs. William Smellie, Langshaw; Cecil Quodling, Eel Creek; Bert Du Rietz, Eel Creek; Michael Nolan, Langshaw; and Arthur Robert Deighton, of Yandaran.

The retirement of Mr. F. G. Connolly, of Rockhampton, from the Public Service, as from the 30th June, 1929, has now been cancelled.

**Atherton Maize Board.**

The period of time for payments by the Atherton Tableland Maize Board has now been fixed from the commencement of the season in each year during which the board may be constituted under "*The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1928," until the commencement of the season in the next year. This period of time has been prescribed in accordance with a section of the Acts which lays down that the payments to each grower of the commodity delivered to the board are to be on the basis of the net proceeds of the sale of all the commodity of the same quality delivered to and sold by the board during such period of time as may be prescribed.

**Peanut Board Election.**

Nominations for the appointment of members to the Peanut Board are:—

District No. 1 (Nanango District) two members—

Charles Frederick Adermann, Wooroolin.

Frederick Christian Petersen, Kingaroy.

District No. 2 (Central District)—

Alfred Skinner Clark, Sandhills.

District No. 3 (rest of Queensland)—

Albert Charles Perske, Degilbo.

Only four members were required and the old board with the exception of Mr. Malcolm Redman, who did not seek re-election, will be appointed for a further term of one year as from the 1st September, 1929. Mr. Petersen is the new member on the board.

**The Royal Society of Queensland.**

The Ordinary Monthly Meeting was held in the Geology Lecture Theatre of the University on Monday, 24th June. The President, Dr. J. P. Lowson, was in the chair.

Mr. G. H. Hardy read extracts from his paper, entitled "Revisional Notes on the Tribe Brachyrrhopalini; with Remarks on the Habits of and Mimicry Amongst Robberflies." He discussed the generic alliances of species included in the tribe, and incorporated keys to the five genera and fifteen species constituting the group. Observations on the habits of robberflies indicated the possibility that mimicry amongst robberflies may occur, and evidence may be obtained from the fact that certain species regarded as being wasp mimics have habits differing from those of their nearest allies. Particular attention was drawn to *Erythropogon limbipennis* (Macquart), which does not seem to be predaceous.

Dr. T. G. H. Jones read extracts from his paper on "A Contribution to the Chemistry of the Oily Exudate of the Wood of Pentaspodon motleyi (Papua)."

The exudation from the wood of Pentaspodon motleyi on examination has been found to consist essentially of apparently homogeneous acid material, for which the name pentaspodonic acid is proposed. Conclusions as to the constitution of this acid are drawn from various experiments recorded, and it is considered that the acid has a molecular composition $C_{23}H_{34}O_3$. Two unsaturated linkages are present in a long side chain attached to a benzine nucleus. The acid, which is monobasic, also contains one phenolic group.

The Secretary, Mr. F. A. Perkins, M.Sc., read extracts from the paper by John Legg, D.V. Sc., and J. L. Foran entitled "Some Experiments on Tick-infested Cattle with Arsenical Dipping Fluids." The following took part in the discussion which ensued: Dr. Jones, and Messrs. Pound, Jones, Perkins, Henderson, and Schindler.

Mr. H. A. Longman exhibited a small slab of fossiliferous limestone which had been found by Miss Marion Rowland amongst rocks considerably above high-water mark on Magnetic Island, North Queensland. This slab contained, amongst other remains, several specimens of Barnacles, apparently *Coronula* sp., present-day species of which are found parastical on whales. Evidently this slab had been detached from its original statum, and if this could be traced it would be of considerable interest.

Mr. Longman also exhibited specimens of the lower jaws of *Macropus anak* and *M. racchus* from the Darling Downs, which he considered were distinct species as indicated by Owen. He could not agree with De Vis in "lumping" both of these under *Macropus anak.*

**The Astor Aeroplane—a Pioneer of Commercial Aviation.**

A winged visitor has come up from the South. It is the Astor Radio Aeroplane, the pioneer of aviation applied to commerce in Australia.

Owned and operated by the distributors of the famous "Astor" Brand of Radio Receivers, the Astor Aeroplane has come north under the instructions of the Queensland Distributors—Queensland Pastoral Supplies, Limited, of Brisbane—in continuance of a Commonwealth-wide campaign on behalf of Astor Radio, in which it is planned to cover 800,000 square miles. Already both Victoria and South Australia have been extensively toured and practically every town of prominence visited, including several in which an aeroplane has never before landed.

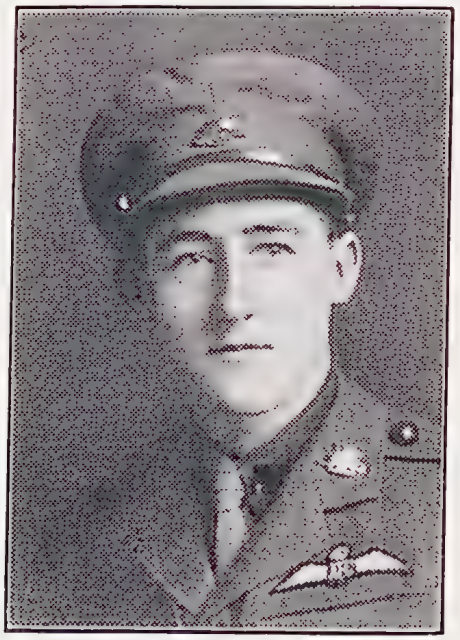

Plate 79.—Captain Frank Roberts.

An ex-Australian Air Force pilot, and a pioneer in the field of commercial aviation in Australia.

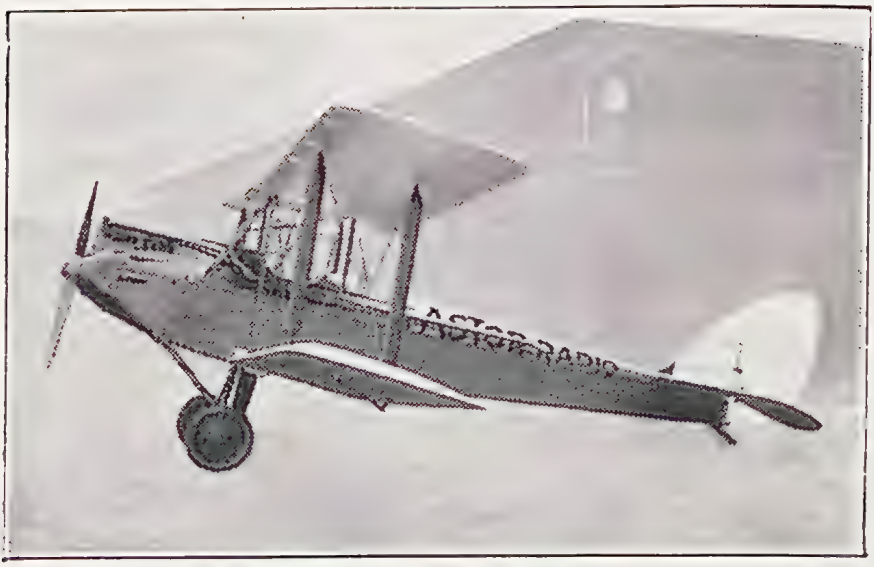


Plate 80.—The Astor Aeroplane. A Commercial Pioneer on Country Airways.

The Astor Radio Aeroplane is a Gypsy-Moth of the latest pattern fitted with the slotted-wing safety device, it is distinctively painted in the black and orange colours of the "Astor" brand. The pilot is Captain Frank Roberts, an ex-war pilot with a distinguished record, who has been engaged in pioneer flying for some years.

Apart from the commercial value of this aerial campaign in introducing radio to the scattered population of this State, the Queensland Pastoral Supplies, Limited, are to be complimented on the singular service they are performing in thus commercially pioneering country airways, and in the awakening of country authorities to the need for establishing properly marked out landing grounds.

The value of commercial aviation to Australian commerce is incalculable, but it will afford some idea of the benefits received when we consider that the special Astor Sales Organiser travelling in the "Astor" 'plane as passenger completed a gigantic sales tour embracing visits to over 200 towns in the space of little over three months, while it would have taken him approximately eighteen months to have covered the same territory by rail and road.

The lack of suitable landing grounds, however, has proved a formidable obstacle to the successful accomplishment of this enterprise; in some cases the "Astor" 'plane being compelled to make risky landings, in one instance in a main street, in another in a marsh.

The response of country municipalities and shire authorities to the responsibility of establishing landing grounds both in Victoria and South Australia has been very encouraging, and this responsibility is becoming recognised in Queensland where the conditions of aerial travel is otherwise so excellent.

## A Bush Remedy.

Few people realise the value of the common milk thistle. The milk from this plant is about the best cure for warts that I know of (says a correspondent of the "Sydney Mail"). While going to school in the bush I was told by an old shepherd that the milk would take a fine crop of warts that I possessed right away. I followed his advice, and a few applications of the fluid proved him to be right. That gave me an idea, and I next tried it out on warts on the teats of our milking cows. These growths disappeared, too, and I now never fail to recommend the thistle as a cure for any kind of warts. Tea made by boiling the stalks in water and then straining the fluid is particularly soothing to the nerves, and I have met people who were very insistent that milk thistles would eventually prove to be the only cure for cancer.

## Still Room for Adventure.

"The Elizabethan merchant," did his full share in building the British Empire. He was at once an explorer, a trader, a fighter, and a diplomat, and in the latter capacity was not possessed of a too sharply-drawn idea of propriety. While to-day there are no such uncharted territories left, there remain opportunities, for him who would, to make his life one of adventure. The spirit of adventure can be as much a state of mind as a condition of geography. If properly encouraged, the young men of this country could and would build into their lives days of fascinating romance, achievement, or overcoming of obstacles. They need not go to foreign countries to do so. When a young man in America or Canada applies for a post, he asks: 'What is the chance to work up?' and a favourable reply is regarded as of even more importance than the immediate wage. I would like to see that spirit permeating every young man in England to-day. Adventure leans on courage, on enthusiasm, on willingness to risk, on strength of purpose, on indifference to obstacles, and on appreciation of the value of time."—Mr. Gordon Selfridge.

## Individuality.

"Those who awake in early life to a fear that they are in danger of being intellectually equipped with bows and arrows to fight in a world where their elders and betters use powder and shot, dimly recognise that individuality is their heritage, and they seek it—or the atmosphere in which it develops—within the confines of their environment. One does not have to be a student of the art of education to come in contact with this ideal," said Mr. H. Lynton Fletcher, of the B.B.C., in a lecture before the Royal Society of Arts on "Educational Broadcasting." "All our literature is full of it. Pestallozzi gave it to the world; Froebel philosophised about it and developed it; Herbert wove a psychology round it; Montessori is full of it; William James never allows one to forget. Sanderson of Oundle applies the principles which underlie it, as, in a lesser degree, Thring of Uppingham did before him. Every psychologist, philosopher, and schoolmaster writes and speaks of it. It is, in fact, universally recognised as the great ideal of education."

### The "Astor" Wireless.

The "Astor" wireless, which is so well and favourably known in New South Wales and Victoria, is now being handled in Queensland by the Queensland Pastoral Supplies, Limited. The "Astor" embraces the shielded neutrodyne plus the new screen grid valve and one dial control.

A wide range is kept in stock embracing the all electric and battery series. It is only necessary to turn the switch and one dial to get into touch with Japan, New Zealand, and all Australian stations. Also the duo symphonic radio, which embraces gramophone and wireless. So perfected are the "Astor" sets that the agents give an unconditional guarantee or money back. Easy terms can be arranged if desired. A fine art wireless catalogue setting out the various models is now ready, and will be sent free on application.

Most of the "Astor" models will give daylight reception of all Australian stations.

The catalogue may be obtained by applying to the Queensland distributors, the Queensland Pastoral Supplies, Limited, Brisbane.

### Speed the Plough.

The plough is the forerunner of all implements, and the mainstay of thorough cultivation; therefore, the ploughing should receive careful attention. If we fail to plough the land carefully, we neglect the most important feature in the preparation of the land for a crop; whereas, if thoroughly ploughed at an even depth, other implements can also do good work, and the crop will grow more evenly than if badly ploughed. Many consider as long as the surface is turned over it is immaterial whether the work is done evenly or otherwise. Others, however, more experienced in cropping, will, no doubt, have noticed that a field ploughed unevenly, or one that has been roughly disced after ploughing, has practically the same effect—the soil is more or less in ridges. When this is so, there is a greater depth of the richer soil in some parts than in others. In other words, the soil is removed from certain parts, and heaped upon the other parts, thus leaving the well-ventilated or sweetened soil very unevenly distributed. The result of this is that the crop will grow better on the ridges, while in the hollows the foliage will wear a more starved or stunted appearance. It is, therefore, apparent that if an even crop is expected, it is essential that the land should be well ploughed, and afterwards well cultivated. Atmospheric nitrogen is composed chiefly of nitrates and ammonia, and reaches the soil dissolved in rain, as in other forms of water, such as snow, hail, fog, or hoar frost, &c. It is also absorbed by the soil from the air, especially when the soil is in a damp condition. Therefore, soil that has been thoroughly cultivated is in a better condition to draw and retain atmospheric nitrogen, hence the necessity of perfect cultivation.—The "New Zealand Farmer."

### Beauty and the Bucket.

It is a common thing for a man who has a poor herd of cows to say that he has "no time for fancy points." He regards the cow which has beauty and symmetry as a "fancy" cow, and the horse that can win a prize as something not worth the attention of a "practical" farmer.

To what extent is this very general opinion justified? Is there in our show rings and in our studs any great difference between our ideas of beauty and of symmetry and the capacity to produce? We think not. Certainly there should not be.

The ideal Clydesdale of the show ring is the horse which, in the view of the most able of our judges, is perfectly equipped for his work. The Clydesdale horse is bred to give service in haulage, and the type we want is that which will give us the greatest power with the least fatigue and the least wear and tear. To ensure that there shall be the least wear and tear, we study conformation; we decide on the best shape of shoulder, on the length and set of pastern.

The ideal beef bull is the beast that will get steers which will carry the greatest quantity of desirable beef at the earliest age. Conformation is our guide again.

The ideal dairy cow is the cow which, year after year, will give us a strong, vigorous calf, and a profitable amount of milk and butterfat. Vigour, capacity for feed and dairy temperament are as necessary as the inherited capacity to produce, and so we look for these points. Conformation—show ring type if you will—is our guide again.

These desirable and "practical" points in a beast are usually associated with more or less beauty and symmetry of form. We call the beast beautiful, or good, which exhibits desirable points of conformation, because, after all, "handsome is as handsome does."—"Live Stock Bulletin."

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### YOUR CHILD'S TEETH.

The first or temporary teeth are formed long before birth. Every baby is born with a mouthful of teeth, though they are under the gums and cannot be seen. Somewhere about the seventh month—the exact age varies much even in healthy babies—the first tooth appears, usually a lower middle incisor (or front tooth). Within the next two months all the incisor teeth may be cut. About the beginning of the second year the first milk molars (or back teeth) appear. At about eighteen months the canine or eye teeth emerge between these and the incisors; about the end of the second year the second milk molars. This completes the first set of teeth, twenty in all.

Teething is not a disease. It is a perfectly healthy process which often gives rise to no trouble at all. At the worst there may be a little fretfulness and dribbling, when the gums are swollen, in a healthy baby. When a baby is sick from any cause the uncut teeth appear to ache, and the mother is apt to mistake this aching for the cause of the illness. As all babies are "teething" from six months to two years of age, this is a very convenient excuse for all the troubles caused by want of knowledge and care.

At birth the crowns of the first permanent molars are already beginning to form; those of all the other permanent teeth are formed inside the gums during the first three years of life, though they do not appear until much later. The first permanent molars appear at about six years behind the milk molars. They are often mistaken for temporary teeth, and allowed to decay early—a very serious error, for they are intended to last a lifetime. Within the next two years the roots of the temporary incisors are absorbed and they fall out, to be replaced by permanent teeth. Within another two years the same happens to the milk molars, later still to the canine or eye teeth, and the second permanent molars appear. The last or wisdom teeth, which complete the permanent set of thirty-two, come much later.

#### The Formation of Good Teeth.

No care after birth will affect the formation of the first set of teeth. To have good teeth the baby must be born of a healthy mother, one who takes plenty of fresh air and exercise, who chooses her food wisely (including fresh milk, eggs, uncooked fruit, and vegetables), but does not eat overmuch, who takes no alcohol, who is not troubled by indigestion (perhaps caused by her own bad teeth), constipation, or kidney disease, and who can thus supply the good blood out of which good teeth are made.

As the permanent teeth are formed in the first three years of life, their good development depends on the care that is taken of those years. For their perfection and durability the baby should be suckled with human milk, the only substance which contains all the materials for forming good teeth in best proportions. If the baby has, unfortunately, to be bottle-fed he should have good cow's milk by preference and a small quantity of cod-liver oil may be advantageous.

#### The Dummy Condemned.

He should have no "dummy," which tends to deform the jaws and crowd the teeth so that they cannot develop properly. After weaning he should be carefully fed with right foods.

When the baby is six months old he should have a bare bone to bite. When he is nine months old he should have a tiny crust or finger of bread baked hard and crisp in the oven. Thereafter he should be given baked bread instead of soft bread

and butter. His crusts should be hard and crisp but not tough. Before he is two years of age baby should have learnt to bite other hard foods, including a piece of raw apple, which is a good teeth cleanser. Jaws that do no work and have no exercise will not grow strong teeth. Mothers are destroying teeth by feeding babies entirely on pap and mush.

Any serious illness or prolonged failure of nutrition during the first three years, although it may be completely recovered from in every other respect, may leave the permanent teeth imperfect.

### Teeth More Precious than Pearls.

Children's teeth are more precious than pearls; we wish as much care were taken of them. School age in this State commences at six years, and soon after entering school the children's teeth are inspected by the school dentists. Not more than *one in twenty* have a clean mouth. Of their fair white infant teeth many are discoloured and broken, some are septic and offensive, some have caused abscesses. Many of these children have suffered from toothache, many of them have been unable to masticate properly and have acquired the habit of bolting soft food; some have been partly poisoned by swallowing foul secretions. Worse than all, owing to the loss of temporary teeth, the jaws have not grown properly, the permanent teeth are crowded and ill-developed. Often the six-year-old molars begin to decay soon after they have erupted. It is a dismal picture. No wonder that many children grow up undersized, ill-developed and weakly; poorly equipped to meet the strains and stresses of after life.

### Knowledge and Care Needed.

Let us try to understand the reasons for this. Some children, as we have already explained, have weakly constructed teeth to begin with, but most of the trouble is due to sheer destruction caused by want of knowledge and proper care. Nature has capped every tooth with one of the hardest substances known, called enamel. It is formed by living cells beneath the gums, but once formed it is a dead tissue, and once destroyed can never be replaced. Nature has therefore made it very hard and resistant, capable of crushing, and grinding, and lasting. It has one weakness—being formed of lime salts, it is dissolved slowly but surely by acids. To guard it from this danger Nature keeps it constantly bathed by an alkaline fluid, the saliva. So cunningly has Nature contrived the mechanism of the salivary glands that they are stimulated to action by all pleasant acid flavour, such as those of fruit juices, which flood the mouth with alkaline saliva. But tasteless, insipid, and alkaline foods do not stimulate the salivary glands, but discourage them. Nature's safeguards were almost perfect until mankind commenced to feed on large quantities of starchy foods and sugar, against which her defensive mechanism was insufficient. These destroy the enamel by forming a paste lodging in the small cavities of the teeth, and the spaces between the teeth, or a glutinous deposit on the teeth. These pastes and sticky substances cannot be penetrated by the saliva, and slowly ferment as they adhere, forming acids. Each atom of acid, as it is formed, unites with an atom of lime from the enamel. As this goes on day after day, month after month, year after year, the enamel becomes petetrated at its weakest spots. Once it is penetrated, the interior of the tooth begins to decay, the living pulp becomes inflamed, and the tooth is lost. In the early stages the dentist can save the tooth by skilful treatment. In the later stages the tooth should be extracted; it is then a source of weakness and poison.

### Prevention Better than Cure.

Prevention is better than cure. Preserve your children's teeth by feeding them in such a way as to assist Nature's defensive mechanism, and not frustrate it. Nature has some difficulty in dealing with bread and butter; a little acid jam will assist her. Bread and butter between meals will in time destroy the teeth; sweet cake will do so more quickly; biscuits made of finely-ground flour (so much advertised and so much used) are even worse. Every meal should contain some acid substance, such as stewed fruit, even canned fruit will do, but without too much sugar. Or a little fresh fruit may be given at the end of the meal, and this is best of all. Apples and oranges are the safest and best, but any acid fruit may be given with care. Understand that we do not say that children should be given too much fruit, but a little fruit at the end of the meal.

### The Value of Fruit Juices.

You may not always be able to give fruit. Then give acid drinks. Children like them, and they are inexpensive. Lemonade made with weak lemon juice and

water with not too much sugar, or bottled limejuice, or a syrup you can make yourself with citric or tartaric acids are all good. Lemon trees are very hardy, and there are few backyards in the coastal districts in which they will not grow. Tea lessens the secretion of saliva, and for this and other reasons should not be given to children.

### Harmful Sweets for Children.

We give our children too much sugar. In excess sugar combines with the mucus of the mouth to form a sticky coating on the teeth impenetrable to the saliva. Sweetmeats and lollies are harmful. None of them are good, but the old-fashioned acid drops and peppermint bulls-eyes were not so bad as chocolates and soft sweets. Children like sweets, but they like fruit better, and fruit in moderation is good for them. Above all, be careful what you give the child in the evenings. The surest way to destroy his teeth quickly is to give him a chocolate or a biscuit when he goes to bed. All night it will be corroding his teeth undisturbed.

### Starting a Good Habit.

When your child gets old enough let him see you clean your teeth the last thing before he goes to bed. He will want to imitate. Let him use a small tooth brush. The mouth should be wide open, not shut, and the teeth should be brushed gently inside, outside, and on the top—brushed as you would brush a dress, not scrubbed as you would scrub a floor. Dip the brush in the fruit acid toothwash described below, and teach him to rinse out his mouth with this afterwards. He should not swallow it, but if he swallows a little it will not harm him. The tooth brush should be carefully rinsed and kept dry.

### When to Call on the Dentist.

Watch your children's teeth carefully, and if there is anything wrong take them to a dentist. Indeed, it would be a good thing if all children had their teeth examined by a dentist once a year, whether they appear sound or not. All teeth showing the first signs of decay should be stopped at once before they get worse. This will save much trouble and expense afterwards, for if the temporary teeth are neglected the permanent teeth may be ruined. The most important of all the teeth to save are the six-year molars, which come through behind the temporary teeth sometimes without the mothers noticing them. They are mistaken for temporary teeth, allowed to decay, and the whole permanent set is spoilt. Dentists consider them "the key of the arch."

*Fruit Acid Tooth Wash.*—Cream of tartar, one flat teaspoonful. Dissolve in one pint of water, and add two or three tiny saccharin tablets, procurable from any chemist. This makes a pleasant acid-sweet solution, which costs very little. Unfortunately, it does not keep, and is suitable only for schools. For domestic use, obtain some "fruit acid tooth wash tablets" from your chemist.

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## BABY CLINICS.

### The "Dummy."

There is no surer sign of want of knowledge of the right way to manage a baby than the use of a "dummy." Before many years the mothers of Queensland will learn this so well that they will be ashamed to be seen using it.

### Reasons Why You should not use a "Dummy."

1. In the newborn babe to suck is a natural instinct, and is the most powerful agent in establishing the secretion of breast milk. If this instinct is diverted to the sucking of a "dummy," it is often partly exhausted before the baby is put to the breast. He does not suck vigorously, and in consequence the supply of milk becomes deficient. Soon he may prefer his "dummy" and the milk may disappear altogether. This is a common reason for failure to establish breast feeding.

2. The "dummy" is a dirty thing. It drops on the floor and picks up dirt, which the baby swallows. If pinned to the baby's frock it is exposed to dust and flies. Every summer we have a serious epidemic of dysentery spread by flies. Mothers who use "dummies" during this season are exposing their babies to infection with a disease which is always grave and sometimes fatal.

3. Dummy-sucking, like thumb-sucking, interferes with the growth of the jaws and the development of the teeth. It favours the development of a high and narrow-roofed mouth and narrow nasal passages, which become easily obstructed.

4. The use of the "dummy" soon results in the formation of a bad habit, and may lay the foundation of a weak and self-indulgent character.

A baby never cries for a "dummy" until he has been trained to expect it, but there are a number of reasons why he may cry, and these should be known to every mother.

### Why do Babies Cry?

The first thing a baby does is to cry. This is how he expands his lungs for breathing. A very young baby cries to strengthen his chest. Let him. In moderation, of course, a good healthy cry will do him no harm.

A baby cries because he is hungry. This also is healthy. If he cries after he is fed it may be because he is not getting enough. The Clinic nurse will probably be able to increase the quantity of your breast milk. If not, she will advise you what to give him after each feed. Never put a breast-fed child on full bottle feeds. If you do this you will soon lose what breast milk you have.

Very often a baby cries because he has colicky pains after feeding. Sit him up after the feed, or put him over your shoulder, so that he may easily get rid of the wind he has swallowed. If that does not soothe him, you may be giving him the wrong food, or too much of the right food. Over-feeding with breast milk is a common way of making crying babies. Perhaps giving the breast soothes him for a short time but makes him worse afterwards.

He may cry because he feels cross and irritable. This is usually due to over-feeding or giving the wrong food. Perhaps he is thirsty in hot weather and wants a drink of water, not milk.

He may cry because he is uncomfortable. Perhaps he has a wet napkin, or a tight binder, or too many clothes on a hot day.

He may cry because he wants his own way. You may have taught him to expect to be rocked to sleep, or to suck a dummy, and he cries because he knows that will bring him what he wants. It is very easy to teach a young baby bad habits; not so easy to break them.

If you want to be a good mother, try to find out why your baby cries. Do not treat him as if he were a bottle, and a dummy were the cork.

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## THE ROSE GARDEN.

In planning a rose garden it is essential to keep in mind the fact that it is a garden in itself, and does not lend itself with any particular advantage to the remainder of the garden. In other words, it is a specialised garden within the general garden, and as such should receive entirely separate attention. To do this, the first point to be remembered is that it should be screened off, in some way, from the garden as a whole. Evergreen hedges, shrubs, supports carrying climbing roses, rose species or a Rosa rugosa hedge are all satisfactory for this purpose.

The next point to remember is that a rose garden is essentially formal in character, and so definite mathematical planning may be successfully carried forward. The beds should be small so that they may be readily cultivated from the surrounding paths; and preferably each bed should be planted with roses of one colour or, if possible, with one variety. The shape of the bed is not of particular importance, as varied interesting effects may be obtained by having them shaped irregularly, while an entirely satisfactory result may be secured, and much more easily too by the beginner, if circular and square or rectangular beds alone are used.

The paths should be straight. Grass paths are preferable to gravel paths, being easy to walk on, restful to the eye, and showing up the rose blooms to greater advantage. The width of the paths is determined largely by the size of the garden, central walks in a large garden being of very good width. In the small garden much labour will be saved by having the grass paths just the width of the lawn mower, so that each path needs to be gone over once only in cutting the grass.

It is usual to have a centre piece in the rose garden—simple or ornate, according to the taste of the owner. A sun-dial or bird bath is very satisfactory, or in larger gardens a fountain may be used.—"The Canadian Horticulturist."

## COUNTRY WOMEN AT WORK.

The Country Women's Association is a banding together of women all over Australia in a bond of love and friendship; and every member is expected to render as much service as lies in her power to her fellow women.

A branch is formed primarily with the intention of creating friendliness among women of the district. After meeting, the natural desire is to work together in this new "oneness" for some objective. So come into being hostels, hospitals, seaside homes, and huts, and the many other objectives of the association.

The objects of the association, as stated in the constitution and rules, are being carried out to a wonderful extent. In order to show in what way these objectives are being carried out it might be well to mention first the objective and then the ways in which it is being met.

1. "To improve the welfare and conditions of life of women, girls, and children in the country."

Most of the branches have rest rooms, which members and country women and children can visit and have a cup of tea, rest between trains or leave children if they are shopping.

Rest tents on show grounds during show weeks are arranged by the majority of the 300 branches. Emergency funds are established, the funds to be expended upon necessitous cases. Most branches keep a supply of clothing on hand to send to those in need of it. Travellers aid committees make much easier the journeys of country women. Families who are unable to afford a needed holiday at the seaside are often sent by the branch to which they belong.

### Branch Activities.

2. "To draw together all women, girls, and children in the country." Each month members meet together, and in most cases the afternoon is a social one. Lectures and demonstrations are given on such subjects as leather and raffia work, pastry making, poultry raising, and other domestic arts. Special afternoons are arranged for children.

3. "To provide opportunities for recreation and enjoyment, bringing them within reach of all members." Every branch at Christmas time provides Christmas trees or some special pleasure for children in their districts, and gifts are given to patients in hospitals.

Libraries have been opened in places where there are no schools of arts. In quite a number of cases recreation grounds have been provided for children.

4. "To encourage women to take an active part in country development by working on committees, such as schools, hospital, ambulances, &c., and to promote a wise and kindly spirit in the community."

Branches of the association have representation on local committees, such as schools of arts, &c., and in one or two cases on hospital boards. Ambulances have the wholehearted support of the association everywhere. Any local interests have the support of branches in raising funds for the welfare of the towns and districts.

5. "To improve educational facilities in the country."

The establishment of educational hostels at Warwick (for girls) and Bundaberg (for boys) is a forward step in the association's desire to assist with the education of country children.

First-aid classes are arranged by many branches with the co-operation of the ambulance brigade.

6. "To secure better provision for the safeguarding of public health, especially of women and children, and to secure medical and hospital facilities for country districts."

The need of accommodation for waiting mothers has long been felt. To meet this need hostels for waiting mothers have been established at Goondiwindi, Warwick, and Stanthorpe.

In towns where there are no hospitals, and sometimes no resident doctors, emergency hospitals and homes have been established.

Branches have provided X-ray plants for local hospitals, and have been instrumental in having maternity wards added to country hospitals.

Members help in providing linen, crockery, &c., for hospitals; nearly every branch in whose district there is a hospital has its visiting committee.

## KITCHEN GARDEN.

Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of this, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be a great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly-dug beds. What the action of salt is is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada beans, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

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## FIVE REASONS IN FAVOUR OF THE HOME VEGETABLE GARDEN.

(1) Fresh vegetables, especially vegetables containing vitamines, are essential to good, robust health, and medical men are now advising people to "eat more vegetables."

(2) The growing of vegetables not only means a saving of money, but educates the children by inculcating a desire to have their own gardens in later life, and so help to keep down the costs of living.

(3) Vegetable-growing is not only a healthy occupation, but it also provides exercise and recreation. In the suburbs it has a tendency to keep young people contented at home, and to trouble less about going to horse races and places of gambling. With country people who, perhaps, are less in need of exercise, gardening is a delightful hobby.

(4) It enables private gardeners to improve the strains of vegetables by a careful selection of seed, much in the same way that a flockmaster improves his sheep; and much satisfaction, and not unusually generous reward are to be gained from this work.

(5) The home garden enables the testing out, in a small way, of the newer varieties of vegetables, which work is not always possible, or, if it is possible, not payable with the professional or commercial gardener. The amateur gardener will find this work both fascinating and health-giving.

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## BEAUTY IN ENVIRONMENT.

"I come straight from two cities where the common folk find an environment which fits in with their sense of beauty—one is ancient Athens, the other is Venice," said the Archbishop of Canterbury at the recent Royal Academy banquet. "In such cities it was possible for the citizens to understand, encourage, and rejoice in great art. But what of our England? We have, indeed, noble buildings, both old and new, but more and more they are set in acres of surrounding vulgarity. Drab and dreary suburbs are crawling everywhere into the countryside. The eye which yearns for beauty and form is affronted at every turn by hideous petrol pumps and tawdry bungalows 'with every modern convenience.' It may be true that the cult of ugliness is diminishing, but the power of ugliness is day by day increasing. How can the civic sense of beauty survive the progress of a civilisation which, if I may borrow the rhetoric of George Wyndham, is 'making a desert of the past and a dustheap of the future'? In a community which suffers these things the general sense of beauty must, sooner or later, perish, and with it all capacity to understand any form of noble art."

# Farm Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimisng the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts; plant sweet potaoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

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# Orchard Notes for September.

## THE COASTAL DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the trees; and, secondly, that there is an adequate supply of the essential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by systematic cultivation, except in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth, or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weakly growth—the orchard should be manured with a quick-acting, complete manure, such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Care should be exercised in the selection of suckers, butts, or bits. Either of the two latter are preferable, and in the case of suckers which have broken into leaf, these should also be cut hard down to the butt. Before planting all roots should be cut off closely and the surface pared or scraped, excepting over the buds or eyes which are allowed for development. Where the butts are split into sections (up to four) according to the number and placements of eyes, these are planted with the eye or eyes facing downwards. In the case of butts, 2 to 3 eyes are left spaced around the butt, any surplus ones being removed. The top having previously been cut down to the corm and the centre scored out. Better growth is evidenced in each case, and as no cut surface is made available (each "plant" being covered by a few inches of soil immediately) beetle borer infestation is not shown.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers; also all bases of plants which have fruited.

When necessary manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash —2 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared —viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate, bonedust or Naru phosphate being preferable.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bonedust, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to

encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed with Bordeaux mixture from then till the time the fruit is ready to colour, in order to prevent loss by downy mildew or anthracnose. Sulphuring may be required against powdery mildew.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance there is of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in Bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

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## MANURE FOR CABBAGES.

To grow cabbages well plenty of manure should be used. There is no manure to which this crop responds so well as animal. For heavy lands horse manure, and for light soils cow or pig are respectively the best when they can be obtained. If the soil is of a poor quality, dig the ground two spits deep, and put a good layer of manure between the two spits. This is especially necessary in the case of autumn or summer crops, which have to stand a dry spell. Spring cabbage—that is, those that are planted in the autumn for use in the spring—do well if planted on ground that has been well worked and manured previously for peas or onions, and on such ground cabbages can be planted without any fresh manure being added. Of other manures lime is an important factor in successful cabbage culture; it is chemically and mechanically beneficial to the soil, and the cabbage tuber. It should be applied at the rate of about 2 lb. to the square yard, and is particularly necessary to heavy soils and those rich in humus. Superphosphate at the rate of 2 oz. to the square yard is good, but should not be applied at the same time as lime or to soils that are infected with club root. When the crop is nicely established, apply 1 oz. of sulphate of ammonia to heavy, damp land, or 1 oz. of nitrate of soda per square yard in the case of light or sandy soil. Nitrate of soda is a splendid fertiliser for the cabbage family. When especially fine heads are required, water the plants once or twice during the growing season with the following mixture:—1 oz. of iron sulphate and 2 oz. of sulphate of ammonia dissolved in 1 gallon of water.

# ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | August, 1929. | | September, 1929. | | MOONRISE. Aug. 1929. | MOONRISE. Sept., 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | a.m. | a.m. |
| 1 | 6.37 | 5.19 | 6.9 | 5.35 | 2.22 | 4.25 |
| 2 | 6 37 | 5 19 | 6.9 | 5.36 | 3.28 | 5.15 |
| 3 | 6.36 | 5.20 | 6.8 | 5 36 | 4.37 | 5.59 |
| 4 | 6.35 | 5.21 | 6.7 | 5 37 | 5.41 | 6.36 |
| 5 | 6 34 | 5 22 | 6.6 | 5.37 | 6.38 | 7.9 |
| 6 | 6.34 | 5 23 | 6.5 | 5 38 | 7.26 | 7.44 |
| 7 | 6.33 | 5.23 | 6 5 | 5.39 | 8.6 | 8 15 |
| 8 | 6.32 | 5.24 | 6.4 | 5.40 | 8.42 | 8.46 |
| 9 | 6.31 | 5.24 | 6.3 | 5.40 | 9.13 | 9.22 |
| 10 | 6.30 | 5.25 | 6.2 | 5.40 | 9 46 | 10.1 |
| 11 | 6.29 | 5.25 | 6.0 | 5.41 | 10.16 | 10.43 |
| 12 | 6.28 | 5.26 | 5.59 | 5 41 | 10.51 | 11.32 |
| 13 | 6.27 | 5.26 | 5.58 | 5.41 | 11.26 | 12.23 |
| | | | | | p.m. | |
| 14 | 6.26 | 5.27 | 5.56 | 5.42 | 12.5 | 1.15 |
| 15 | 6.25 | 5.27 | 5.54 | 5.42 | 12.49 | 2.10 |
| 16 | 6.24 | 5.28 | 5.52 | 5.42 | 1.39 | 3.8 |
| 17 | 6.24 | 5.28 | 5.51 | 5.43 | 2.31 | 4.6 |
| 18 | 6.23 | 5.29 | 5 50 | 5.43 | 3.14 | 5.3 |
| 19 | 6.22 | 5.29 | 5.49 | 5.44 | 4.19 | 6.1 |
| 20 | 6.21 | 5.29 | 5.48 | 5.44 | 5.20 | 6.57 |
| 21 | 6.20 | 5.30 | 5.47 | 5.45 | 6.15 | 7.56 |
| 22 | 6.19 | 5.30 | 5.46 | 5.45 | 7.11 | 8.59 |
| 23 | 6 18 | 5.31 | 5.45 | 5 46 | 8.8 | 10.3 |
| 24 | 6.17 | 5.31 | 5.43 | 5.46 | 9.5 | 11.9 |
| 25 | 6.16 | 5.31 | 5.42 | 5.47 | 10.3 | ... |
| | | | | | | a.m. |
| 26 | 6.15 | 5.32 | 5.40 | 5.47 | 11.4 | 12.16 |
| 27 | 6.14 | 5.32 | 5.39 | 5.48 | ... | 1.18 |
| | | | | | a.m. | |
| 28 | 6.13 | 5.33 | 5.38 | 5.48 | 12.10 | 2.17 |
| 29 | 6.12 | 5.33 | 5.37 | 5.49 | 1.16 | 3.10 |
| 30 | 6.11 | 5.34 | 5.35 | 5.49 | 2.22 | 3.54 |
| 31 | 6.10 | 5.34 | | | 3.26 | |

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

## Phases of the Moon, Occultations, &c.

| | | | |
|---|---|---|---|
| 5 Aug. | ● | New Moon | 1 40 p.m. |
| 12 „ | ☾ | First Quarter | 4 0 p.m. |
| 20 „ | ○ | Full Moon | 7 42 p.m. |
| 28 „ | ☽ | Last Quarter | 6 0 a.m. |

Perigee, 4th August, at 7.12 a.m.
Apogee, 16th August, at 1.0 p.m.

The ringed planet Saturn will be at its highest point in the sky, nearly overhead in Queensland, about 9 p.m., at the beginning of the month. Towards the end it will be about one third of its way downward to the west, followed by the fine constellation Sagittarius. Saturn's rings are nearly at their best.

On the 15th at 3 p.m. the Moon will be passing 4 degrees to the southward of Saturn. This should afford another interesting daylight spectacle for keen eyes, though binoculars or telescope will aid in seeing Saturn. The Moon will pass nearly directly overhead at Brisbane at an early hour after sunset on this and the following night.

The occultation of Phi Sagittarii, magnitude 3.3, will take place on the night of the 16th, about half-past 8 at Brisbane, Toowoomba, and Warwick, but somewhat earlier at Townsville.

When the Moon rises on the night of the 28th it will be interesting to notice the proximity of the planet Jupiter which will be to the northward. Its brightness will exceed that of Sirius, the finest fixed star, which will rise in the south-east about half-an-hour later.

During this month the Southern Cross will be on its downward path towards the west during the evening hours. It will reach its extreme western point about 10 p.m. on the 1st, and about 8 p.m. on the 31st, and being horizontal it will be at a height above the horizon equal to the latitude of the place where the observer is situated.

| | | | |
|---|---|---|---|
| 3 Sept. | ● | New Moon | 9 47 p.m. |
| 11 „ | ☾ | First Quarter | 8 47 a.m. |
| 19 „ | ○ | Full Moon | 9 16 a.m. |
| 26 „ | ☽ | Last Quarter | 12 7 a.m. |

Apogee, 13th Sept., at 5·18 a.m.
Perigee, 28th Sept., at 10.42 a.m.

The conjunction of the two planets Mercury and Mars will form an interesting spectacle on the evening of the 10th when they will be visible well over the western horizon after the Sun has set, wherever no clouds intervene. Mercury will be 3 degrees (one half the length of the Southern Cross) southward or to the left of Mars.

The nearness of the Moon and Saturn on the evening of the 11th will be an interesting observation. As they approach the western horizon at a late hour the apparent nearness will increase until the distance between them will be only eight times the diameter of the Moon. The Moon will pass on the south side of the planet and next evening at eight o'clock will be 12 degrees, or twice the length of the Southern Cross, to the eastward of Saturn.

On the 23rd the Sun will enter the Sign Libra but not that constellation; it will remain, apparently, in the constellation Virgo.

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# QUEENSLAND AGRICULTURAL JOURNAL

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## Event and Comment.

### The Brisbane Show.

SPEAKING at one of the official functions of Exhibition week, His Excellency the Governor-General, Lord Stonehaven, said that the Brisbane Show played an invaluable part year by year in helping the producer, and in doing that it carried out precisely the work which the Royal Agricultural Society is doing in Britain. That society had been incorporated only in 1840, and it was universally admitted that the immense improvement in the breeding of stock and the standard of agricultural products had been greatly stimulated by its work and influence. It had encouraged the formation of other societies throughout the old country in exactly the same way as the Royal National Association of Queensland had done, and it had set up a standard that had led to an improvement nothing else could have achieved. And the parallel did not cease there. It afforded scope for the carrying out of a tradition which had existed for many centuries in the old country, that the ownership of land involves the discharge of a great deal of onerous unpaid work. When he thought of Mr. Baynes and of his colleagues on the council of the National Association, and the splendid work they were doing for the State of Queensland, for Australia, and for the Empire, he felt they were fully entitled to the proud privilege of carrying on those British traditions. And even that was not the end of the parallel. It had been claimed for the Royal Agricultural Society that it encouraged practical farming on sound scientific principles. In these days of efficiency nothing but the best was good enough, and that was what the Royal National Association of Queensland, following the same lines as the Royal Agricultural Society of Britain, was helping this State and the Commonwealth to achieve.

## A Problem to Solve.

CONTINUING, Lord Stonehaven said that the next stage to be reached was really one outside the scope of such associations. When he saw such excellent products as were displayed at their shows—tropical fruits and other products—and realised that they could not produce enough of them to supply the demand, it was evident to him that they had a problem to solve. He looked forward to the day when they would make as big and as concentrated an effort on the packing, shipping, and the marketing of their products as they now were concentrating on the producing of them.

## The Position of the Commonwealth—An Optimistic Outlook.

LORD STONEHAVEN went on to say that if they read the newspapers they would come to the conclusion that Australia was passing through a bad time. Now, he would suggest to them that that was only true in a relative sense. The latest available figures showed that Australia last year had 106,115,100 sheep, or 10,000,000 more than the average of the last six years, and from that it would appear that the wool industry was not in a really bad position. Then there was a good deal heard about a drop in the price of wool. He had read that it was estimated that the clip for 1929-30 was likely to be 100,000 bales less than last year, and the same industrious people who had worked out those figures said that if the price remained the same as it was at the end of last season the value of the clip would be £3,000,000 less than the average for the last five or six years, which was £53,000,000. But even with that reduction it would be more than £20,000,000 above what it was before the war. So, although there certainly had been a drop in the price of wool, he would suggest that there was no cause for pessimism, and that the optimistic view which had been taken by representative men who had come from overseas to investigate conditions in Australia was fully justified. There were other points that might be regarded as distinctly cheering. The exports of Australian mutton and lamb last year, for instance, were 85 per cent. in value higher than in the previous year. The exports of beef were 22 per cent. higher, and of butter and cheese 10 per cent. higher. Australia exported £20,000,000 worth more wheat last year than in the year before, the crop being the third largest in the history of the Commonwealth, and the value of the wheat exported was 40 per cent. more than that of the previous year. When they read figures that seemed to be depressing, he hoped they would take into consideration the more cheering points to which he had referred. It must be remembered that there was no industry in which more ups and downs were experienced than that of the pastoralist or the farmer, and, taking all things into consideration, there was no room for gloom or depression, because things were not so bad to-day as they were a few years ago.

## The Call of Country Life.

AT the same function His Excellency the State Governor, Sir John Goodwin, said it was always a delight both to Lady Goodwin and himself to attend the Brisbane Show. They both learned a great deal from what they saw there, and it was a keen pleasure to them to meet their friends, old and young, from all over the country. All his life he had been devoted to the land and to the work of the farmer; but unfortunately his duties had taken him abroad, and his work in the army had prevented him from seeing as much of it as he would have liked to do. With regard to the dairy cattle and the exhibit in the meat hall, he would say without hesitation that they compared favourably with anything that could be seen in any part of the world. The district and family exhibits he had always considered to be very valuable indeed. He saw one exhibit on the previous day the exhibitor of which had been second for seven years in succession, but this year he had come out on top. That was typical of Queensland and its people—to go on trying until finally victory was attained. He regarded the annual shows as especially valuable from an educational point of view and for the encouragement given to science. Its educational value indeed was beyond all words. He had been greatly interested in the farm boys' camp, in which twenty-seven boys from all parts of the State were taking part and showing themselves most eager to work and to learn all they possibly could. He was pleased to find that the boys were students from Gatton College and undergraduates from the University.

## Our Reliance on Rural Industry.

THE Premier, Hon. A. E. Moore, met with a rousing reception on the same occasion. He said he thought he had made it quite clear in his public utterances for some time past that he considered that the progress and prosperity of Queensland was dependent to a very great extent on the industry and enterprise of its rural

population. Consequently, he thought any association that was doing what was in its power to stimulate and encourage the producer in his work was rendering a real service to the community.

The farmer also who produced seed which would yield better crops was serving a like good purpose. Not only were they reaping a benefit for themselves, but, by distributing that better stock or better seed throughout the length and breadth of Queensland, their action must have an ever-widening effect for the benefit of all. The National Association was doing splendid work in giving encouragement to such enterprise.

It had been said by people who should know that if the knowledge already gained could only be made of general application it should be possible, by the top-dressing of the pastures, to increase the productive capacity of the pastoral lands. By such means as this, by the use of licks as an adjunct to the stock foods, and by the application of other scientific discoveries the wealth of Australia would be doubled. The Royal National Association was putting forward the results attained by the few with the object of encouraging the many to follow the good example set.

So far as the Government was concerned, he did not think it could be better employed than in encouraging scientific research for the combating of pests and for increasing the productive capacity of the land generally.

## The Council of Agriculture—Lessons of Farmer Organisation.

THE Minister of Agriculture and Stock, Hon. Harry F. Walker, was elected unanimously to the presidency of the Council of Agriculture at its recent annual meeting. On taking the chair, Mr. Walker expressed his appreciation of the action of the Council of Agriculture in electing him as its president. He regarded the occupancy of the presidential chair as an honour accorded to him by farmer leaders with whom he had been associated for many years. There were three reasons particularly which led him to especially value the honour, and they were, firstly, because he was a farmer himself; secondly, because he had learnt the value of co-operative organisation in the hard school of experience; and thirdly, because, as Minister of Agriculture, he realised the value of personal contact with the representatives of the producers in the study of their problems.

As a farmer, he knew the difficulties attendant upon any phase of primary production. He had personally experienced all that is entailed in the carving of a holding out of the bush—the climatic diversity and perversity, the disappointments, the marketing complexities and perplexities, and all that is involved in the life of the man on the land. Because of that experience he would always be able to understand the viewpoint of the individual farmer, and welcomed the opportunity of service which direct association with their organisation would give him.

As a dairyman and as one who held the chairmanship of one of the leading co-operative dairy companies for many years, he understood the value of co-operative organisation. He had taken part in its preliminary organisation, which was followed by the successful establishment of a large manufacturing plant; and afterwards it was his privilege to join in the binding together of the co-operative factories themselves. The work of the Co-operative Dairy Companies' Association thus formed, and of the Butter Pool and of the Paterson Stabilisation Committee, had only to be mentioned to a gathering of producers to bring about a realisation of what their activities had meant in pounds, shillings, and pence to the dairymen. Similarly, in other branches of rural industry many instances could be given of the value of co-operative combination. Inasmuch as he had been associated with co-operative enterprise in the past, he hoped to be able to continue to place whatever influence he possessed on the side of any co-operative organisation formed and controlled by farmers. He had been given an assurance that the activities of the several units of the Queensland Producers' Association, of which the Council of Agriculture is the executive body, are of a strictly non-political character. He had also been assured that the organisation is functioning along co-operative and economic rather than political lines. He hoped the organisation would remain non-political always, and his acceptance of the position of president had therefore no political significance.

As Minister of Agriculture, he knew how necessary it was to establish close contact with the farmers and the associations they had established for their protection and betterment. He felt that his position of President of the Council of Agriculture would assist him in maintaining that contact. With an understanding of the actual view of the man on the land regarding some of his problems, he hoped to be able to deal with any aspect of those problems presented to him as Minister intelligently and sympathetically, and in that way continue the goodwill between himself and his Department on the one hand and the farmers and their organisations on the other.

# Bureau of Sugar Experiment Stations.

## ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

By EDMUND JARVIS.

The common cane pests in evidence during this month are usually limited to the "weevil borer," termites (white ants), army worms, and grasshoppers.

### The "Weevil Borer" or "Cane Borer."

Unfortunately, this insect is, perhaps, only too well known to many of our growers. It is a slender, dark-brownish, reddish-brown, or dark-grey coloured beetle about three-quarters of an inch long, having its head produced into a prominent beak-like snout. Although able to fly well during nightfall, its movements by day, when cut out of a cane stick, are always slow and clumsy, and upon falling to the ground it will often sham death for several seconds before trying to crawl under cover. Signs of its presence in a cane stick are indicated by clearly cut small holes or fissures in the rind; these being found mostly at the basal portion of canes, although in cases of severe attack the tunnels and holes made by these weevils may extend. more or less, throughout the affected stick.

Artificial methods of fighting them are trapping or collecting the beetles, trashing the cane to admit more wind and light, &c. Happily, however, a more simple remedy has been found by enlisting the services of a natural parasitic enemy which destroys the grub or larval form of this pest.

These useful flies will be liberated by officers of the Sugar Bureau, free of cost, on plantations harbouring weevil borers. Application for a consignment of such parasites should be made to the Entomologist at Meringa Experiment Station, near Cairns.

### Termites or "White Ants."

Growers north of Townsville occasionally meet with white ants eating their cane setts or nesting amongst the roots of old ratoons. Such trouble, as a rule, only occurs on newly-cleared land planted for the first time. Fumigation of the affected soil with carbon bisulphide, and of any subterranean nests or conical anthills chancing to exist in the immediate vicinity with ordinary benzine, can be recommended as being suitable remedies.

### "Army Worms" or "Caterpillar Plague."

Little trouble is likely to arise from the activities of this moth pest until the end of the present month (September). Growers should, nevertheless, keep a sharp lookout for indications of damage to their young ratoons or plant cane by leaf-eating caterpillars, with a view to preventing entire destruction of the foliage. This Experiment Station is now provided with very efficient spraying apparatus, suitable for combating any species of "grass caterpillars," "army worms," or leaf-eating beetles, &c. Timely notice should be made to the Entomologist of all outbreaks of such nature which may occur here, in order that remedial measures may be undertaken with the least possible delay.

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## DISEASE SURVEY IN PROSERPINE DISTRICT.

*The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (20th August, 1929) from the Pathologist, Mr. A. F. Bell:—*

The Division of Pathology is now carrying out a disease survey of the Proserpine district. A total of 112 farms has been inspected, and the survey completed in the Breadalbane, Glen Isla, Waterson, and Banana Pocket sections, and practically completed in the Up River and Hamilton Plains sections. In general, the disease situation is satisfactory, except for the large amount of Mosaic on the farms in the Proserpine River district. This disease was found on the majority (43) of the farms in the neighbourhood of the river; the percentage infection is

highest in the fields right on the river bank, and decreases as the distance from the river becomes greater. Mosaic was also found on three or four farms at Banana Pocket, and is known to occur to some extent at Conroy.

Mosaic disease is the most common of the important cane diseases of the world, and in the past twenty years has been responsible for disastrous losses in a number of countries. It is spread from plant to plant by an aphis which lives on corn, sorghum, &c., and a number of wild grasses. The spread is rapid close to the river bank on account of the large amount of grass there providing a favourable breeding ground for the aphis. The main measures to be adopted for the control of Mosaic disease are (1) The careful selection of disease-free cane for planting purposes; (2) careful inspection of the plant cane and the uprooting of any diseased stools found; and (3) cultivation to keep the fields as free from grass and weeds as possible.

Red Rot is also common throughout Proserpine, especially in the variety H.Q. 426. This disease may be controlled in part by the selection of seed, and any sets showing a red discolouration should not be planted.

Downy Mildew, or leaf stripe, was found in one field of B. 208. This variety is very susceptible to both Mosaic and Downy Mildew, and should not be planted except on the advice of the officers of this Bureau.

The selection of seed cane is one of the most important aspects of canegrowing and should be carried out by the farmer himself. In the case of Mosaic, when infection is light seed selection is a simple matter, but when the percentage infection is over about 5 per cent. the seed cane should be purchased from a disease-free farm.

For the purposes of ensuring a supply of disease-free cane for planting purposes, the value of the farm nursery cannot be over-estimated. The farm nursery should be planted up each time with disease-free cane, and the resultant plant cane should be inspected frequently, and any suspicious stools removed. The nursery should be kept free from weeds and given the best possible tillage and fertilisation. If the nursery is removed some distance from the rest of the farm so much the better. A plan for the layout of a farm nursery and propagation field is given in the "Queensland Agricultural Journal" for June, 1929 (page 400).

Any farmers desirous of purchasing cane for plants are advised to get in touch with the Cane Inspector or the Secretary of the Canegrowers' Association, as the Bureau has furnished these officials with lists of the farms on which least disease was found.

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## CANE PESTS AND DISEASES.

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (6th August, 1929) from Mr. A. N. Burns, Assistant Entomologist, Mackay:—*

### The Golden Beetle (*Calloodes mastersi* Macleay), in the Mackay District.

This rather showy beetle is recorded as ranging from the Ingham district to somewhere about St. Lawrence; it is, however, very plentiful in some seasons in parts of the Mackay district, also on the Lower Burdekin, and often very abundant around Ingham. Some years ago in the area round the Macknade Mill (Ingham) they were collected by beetle gatherers and paid for by the Local Pest Destruction Board, at the rate of 1s. 6d. per quart, but at that time and until quite recently there was no actual evidence that their grubs attacked cane roots.

In the Ingham area the beetles are recorded as feeding on the leaves of bamboos and the introduced "pink burr" which is so plentiful along cane headlands, roadways, &c. In the Ayr district their favourite feeding-tree appears to be a large-leaved, soft-wooded tree or shrub which much resembles the wild tree hibiscus (*H. tiliaceus*), whilst in the Mackay district their feeding-tree is the prickly cork tree (*Erythrina verspatilia*), sometimes called the "bat-wing" leaved tree on account of the peculiar shape of the leaves, which somewhat resemble a bat with its wings half expanded. As far as the writer has observed, this tree appears to be the only feeding-tree of this beetle in this district. The beetles sometimes occur so plentifully as to completely defoliate one of these trees in the course of a few days. Normally the beetles fly about Christmas time, and during the past season they were in full flight by the 24th December, 1928, and they remained in evidence till the middle of January.

### Habits of the Beetles.

These beetles appear to revel in sunshine, for, when watched on one of their feeding-trees where they were in hundreds, they were in a state of constant activity whilst the sun shone, and were flying from twig to twig, but if the sun became obscured by a cloud, they quietened down considerably. They are rapid and voracious feeders; one of the trees that was under observation was about 14 feet high, with dense and fairly spreading foliage, and it was completely denuded of leaves within a few days. Mating takes place in the daytime on the feeding-trees, the male resting on the back of the female. This act apparently takes some time, because many pairs thus observed remained so during the whole period of observation, which was considerably over half an hour. Any sudden jar or movement of the twigs or leaves causes the beetles to take to wing; they however soon settle again and recommence feeding. They do not appear to be readily attracted to artificial lights, as only occasional examples flew to light whilst collecting beetles with a lantern, and these were invariably males. An odd specimen could sometimes be collected from under the electric lights at the street intersections.

That the grubs of this beetle attack cane has been definitely proved by the writer during both the 1928 and the present season. Whilst making a grub survey at Mount Jukes on 22nd February, 1928, grubs were obtained at cane roots. At first they were thought to be grubs of the Pentodon beetle, but when taken to the Laboratory and bred through, proved to be those of the Golden beetle. Grubs are at present being bred at the Laboratory, and are feeding freely on cane sets and roots; the nature of the injury is very similar to that occasioned by grubs of the Christmas beetle (*A. boisduvali* Bsd.). These grubs appear to favour fairly heavy scrub soils; where they were collected at Mount Jukes the cane was growing in rich scrub land. At the Laboratory also grubs in cages containing heavy soil appeared healthier and grew faster than those caged in sandy soil.

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*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (16th August, 1929) from the Assistant Entomologist at Mackay, Mr. A. N. Burns, for the month ended 12th August:—*

### Bandicoots in Canefields.

Whilst making inspections of cane farms for insect pests, farmers frequently ask the question "Is the bandicoot a friend or an enemy?" Many growers hold differences of opinion regarding this point. It is true that in almost every canefield there are indications of their excavations at cane stools, but these diggings are invariably greatest and most numerous in patches of cane where grubs are prevalent.

Growers are often of the opinion that the exposure of the cane roots and partial undermining of the stools tends to cause withering of the cane, and, in extreme instances, to lose its anchorage with the soil, and thus fall over. The latter condition would, in the writer's opinion, be hardly possible without the assistance of grubs, when the roots that were not exposed through the bandicoots' diggings would also be destroyed. No doubt several holes made round a stool by these animals would tend to allow moisture to evaporate away from the roots.

The diet of the bandicoot appears to be very varied, perhaps some roots are eaten whilst the animal is excavating at a stool, but the amount of injury thus caused would probably ensue as a result of grub injury; therefore, if the bandicoot destroys two or even one grub at each stool, the good done by the destruction of those grubs at least compensates for the amount of root injury done. On the other hand, there are many growers who regard the bandicoot only as a friend, their explanations for this being that the only places on their farms where the work of these animals occurs is in the patches that are attacked by grubs. In the experience of the writer, certainly by far the greatest number of "excavated stools" has been observed in areas where grubs were attacking the cane. These animals are said to be possessed with a very keen sense of smell, which enables them to locate the presence of grubs in the soil.

The following extract from Bulletin No. 13, 1921, Bureau of Sugar Experiment Stations, gives the following remarks with regard to the stomach contents of a bandicoot. A specimen was dissected and the stomach contents examined; these contained "a cutworm larva, five unknown caterpillars, four locusts (winged grasshoppers), one centipede, two large and eight small spiders, two slugs, a small beetle, many small ants, three large ants, eight large crickets and six small ones,

sixteen legless beetle grubs, similar to those of the cane beetle borer or New Guinea borer, numerous portions of ground beetles, and remains of other insects. Some portions of vegetable matter were found as well; these included a piece of bark, three small roots, a couple of bits of grass, two leaves of some weed, and a small piece of dry stick.''

It is quite possible that the bark, leaves, and wood were eaten with the insects—perhaps swallowed by accident—whilst the bandicoot was foraging for insect foods.

It may be seen from this examination that the majority of the stomach contents was insectivorous; this particular examination, too, it is recorded, was made at the time of year (July) when insects are comparatively scarce.

In June and July cane grubs, both of the greyback and Frenchi beetles, burrow downwards to form their pupal or resting cells. This would likely account for no grup remains being discovered in the stomach contents that were examined. In the same Bulletin (No. 13, 1921) reference is made to examinations made of the stomach contents of bandicoots during the month of March when cane grubs are always prevalent. This further record states—''These examinations showed a strong preference for this pest (i.e., cane grubs), because the stomach contents were usually well supplied with the chitinous (heads) remains of cane grubs, and no plant tissues.''

Bandicoots in Victoria frequently dig holes into rotten logs and stumps, or round the roots of very old and rotten trees, in the search for beetle grubs which are plentiful during the spring and summer months in such situations. The writer has also occasionally observed their excavations in the large nests of some of the large sugar ants (Campanotinæ) and bulldog ants (Myrmecinæ).

It is really only during a great scarcity of insects that bandicoots might partake of any appreciable amount of vegetable food; but in a sub-tropical or tropical climate such as exists in the Queensland canegrowing areas, insects of some kind are always more or less plentiful at every month of the year, therefore the good done by these animals may assuredly be considered in excess over the destruction sometimes attributed to them.

### Large Moth Borer (*Phragmatiphila truncata* Walk.)—Injury to Mature Cane.

Several inquiries have recently come to hand from farmers who were engaged in cutting plants, of ''ring-necked sticks,'' the ring neck or borer tunnel round the stick usually occurring just above or below the nodes. Tunnelling may also occur in the internodes, but in these situations it is usually longitudinal instead of horizontal.

The softer varieties of cane such as H.Q. 426 (Clark's Seedling) and B. 208 are particularly susceptible to attack from these borers, and inspections made during the past month on farms where these varieties were growing revealed in one or two instances appreciable injury. It is usually the outer cane rows adjoining the headlands or fences that are subjected to the worst attack. Other varieties of cane are also injured by these borers, but not to nearly so great an extent as the two abovenamed varieties.

When cutting cane for plants care should be exercised to exclude any ''bored plants'' as these would possibly not strike, but would simply rot or ferment in the ground as a result of the damage caused to their tissues.

At this time of year practically all the injury done to cane by these caterpillars is confined to the mature sticks; now that cutting has commenced and young ratoons will soon be appearing, growers should keep a lookout for the appearance of ''dead hearts'' in the young cane shoots. As a rule, young plant cane does not appear to be quite so seriously attacked as ratoons, though it often suffers considerable damage. The reason that young ratoons are slightly more susceptible to injury from these borers is owing to the fact that the point of entry of the caterpillar into the shoot is usually in the side and near the basal portion of the shoot; in plant cane this part is mostly between the ground surface and the point of attachment with the set, whereas in ratoons considerably more of the lower parts of the shoots are exposed or aboveground.

Natural parasites—the principal one of which is a minute Braconid wasp—that infest the caterpillar stage of this insect, do not apparently exert much control as shown by breeding out a large number of specimens at the laboratory last year. The examples that were kept under observation were collected from a field of H.Q. 426 first ratoons, where the percentage of attacked shoots in three particular rows was estimated to be 70 per cent. No parasites emerged from the caterpillars collected from these rows.

The earliest indications of the presence of moth borer caterpillars in young shoots is a shrivelling of the central folded leaves, followed by a wilting and complete dying. When dead, if pulled gently these central shoots will come away, and if examined the lower part will be seen to be eaten through and rotten. It frequently emits an offensive odour, and often little whitish maggots may be seen in the rotten material. These are not the borer caterpillars, but are purely secondary in their occurrence; they are the maggots or larvæ of small flies which breed in decaying vegetable matter.

The most practical method of controlling moth borers is to cut out from as near as possible to the point of attachment with the stool any shoots which show indications of shrivelling or wilting in the central leaves. If cutting these is delayed until the centre leaves are quite dead, the cutting out of such shoots at so advanced a stage is useless, because the borer caterpillar will have left and entered into a fresh shoot. One caterpillar may account for a number of shoots, and will not necessarily confine its attacks to one stool only.

The fully-grown borer measures from 1⅜ inch to 1¼ inch in length, and is of a light pinkish or purplish brown colour on the back and sides. It is pale greyish or pinkish on the central or under surface. A complete description of its life history and habits in the Mackay district was detailed in the entomological report of this station for the month of May last year.

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## RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JULY, 1929, AND 1928, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | July. | No. of Years' Records. | July, 1929. | July, 1928. | | July. | No. of Years' Records. | July, 1929. | July, 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | | | | |
| Atherton .. .. | 1·00 | 28 | 0·52 | 2·23 | Nambour .. .. | 2·78 | 33 | 0·30 | 1·02 |
| Cairns .. .. | 1·58 | 47 | 0 46 | 1·50 | Nanango .. .. | 1·70 | 47 | 0·25 | 0·84 |
| Cardwell .. .. | 1·38 | 57 | 0·18 | 0·64 | Rockhampton .. | 1·45 | 42 | 0 | 0·30 |
| Cooktown .. .. | 0·99 | 53 | 0·54 | 0·26 | Woodford .. .. | 2·41 | 42 | 0·38 | 1·38 |
| Herberton .. .. | 0·79 | 42 | 0·29 | 2·58 | | | | | |
| Ingham .. .. | 1·54 | 37 | 0·50 | 0·73 | | | | | |
| Innisfail .. .. | 4·72 | 48 | 1·49 | 5·15 | | | | | |
| Mossman .. .. | 1·39 | 16 | 0·03 | 0·86 | *Darling Downs.* | | | | |
| Townsville .. .. | 0·64 | 58 | 0·06 | 0·02 | | | | | |
| | | | | | Dalby .. .. | 1·73 | 59 | 0·57 | 1·18 |
| | | | | | Emu Vale .. .. | 1·57 | 33 | 0·57 | 2·07 |
| *Central Coast.* | | | | | Jimbour .. .. | 1·58 | 41 | 0·35 | 1·32 |
| | | | | | Miles .. .. | 1·67 | 44 | 0·39 | 2·15 |
| Ayr .. .. | 0·72 | 42 | 0 | 0 | Stanthorpe .. .. | 2·05 | 56 | 1·11 | 2·54 |
| Bowen .. .. | 0·94 | 58 | 0 66 | 0·08 | Toowoomba .. | 2·04 | 57 | 0·69 | 1·61 |
| Charters Towers .. | 0·66 | 47 | 0· | 0·09 | Warwick .. .. | 1·82 | 64 | 0·76 | 1·84 |
| Mackay .. .. | 1·67 | 58 | 0·22 | 0·05 | | | | | |
| Proserpine .. .. | 1·36 | 26 | 0 05 | 9·55 | | | | | |
| St. Lawrence.. .. | 1·30 | 58 | 0·02 | 0·09 | *Maranoa.* | | | | |
| | | | | | Roma .. . | 1·45 | 55 | 0·19 | 0·82 |
| *South Coast.* | | | | | | | | | |
| Biggenden .. .. | 1·38 | 30 | 0·12 | 0·64 | | | | | |
| Bundaberg .. .. | 1·85 | 46 | 0·04 | 0 96 | *State Farms, &c.* | | | | |
| Brisbane .. .. | 2·24 | 78 | 0·53 | 0·72 | | | | | |
| Caboolture .. .. | 2·20 | 42 | 0·32 | 1·04 | Bungeworgorai .. | 1·43 | 15 | 0·06 | 0·50 |
| Childers .. .. | 1·73 | 34 | 0·04 | 0·67 | Gatton College .. | 1·34 | 30 | 0·65 | 0·79 |
| Crohamhurst .. | 2·94 | 36 | 0·32 | 1·43 | Gindie .. .. | 0·95 | 30 | 0 | 0·23 |
| Esk .. .. | 1·98 | 42 | 1 19 | 1·50 | Hermitage .. .. | 1·72 | 23 | 0·76 | 1·65 |
| Gayndah .. .. | 1·47 | 58 | 0 05 | 0·67 | Kairi .. .. | 1·20 | 15 | .. | 1·21 |
| Gympie .. .. | 2·16 | 59 | 0·55 | 1·39 | Mackay Sugar Experiment Station .. | 1·46 | 32 | 0·16 | 0 |
| Kilkivan .. .. | 1·64 | 50 | 0 39 | 0·86 | Warren .. .. | 1·20- | 14 | 0 | .. |
| Maryborough .. | 1·90 | 57 | 0·03 | 1·20 | | | | | |

GEORGE G. BOND,
Divisional Meteorologist.

# PESTS OF BANANAS.*

By ROBERT VEITCH, B.Sc., F.E.S., Chief Entomologist.

Banana-growing in Queensland is unfortunately probably more handicapped by the incidence of pests and diseases than any other branch of fruit culture in this State. The entomologist has to handle such extremely serious and difficult pests as the banana weevil borer and the banana thrips; less serious but still important sources of loss that come within his province are such pests as the fruit-spotting bugs, fruit-eating caterpillars, and the banana fruit fly. There are quite a number of other insect enemies of the banana, but they are all, at least at present, of trifling importance to the grower, and reference need not be made to them in these notes, except in the case of the banana aphis. The latter is of no consequence so far as actually weakening the plant by sap-sucking is concerned, but it is of first-class importance as the insect vector of bunchy top.

The banana weevil borer has been the subject of an exhaustive investigation by J. L. Froggatt, and readers who wish to acquaint themselves with all aspects of the borer problem should consult the bulletin prepared by that investigator. Banana thrips has also received considerable attention and a bulletin thereon has been written by Girault, and here again the reader may consult a much more extensive fund of information than can be given within the pages of a handbook such as this. Girault's investigation was followed by further work by Froggatt, dealing more particularly with the question of the field control of the banana thrips.

## The Banana Weevil Borer.

The banana weevil borer (*Cosmopolites sordida* Chevr.) is without doubt the most destructive insect enemy of the banana plantations of Queensland. Not only is its attack frequently one of great severity, but there is also every reason for believing that few, if any, districts in this State are free from infestation. The available evidence apparently indicates that this species is not a native of Australia, but it is now a matter of extreme difficulty to indicate with any degree of confidence the native home of this very destructive weevil. It has been recorded from Africa, Australia, Ceylon, Fiji, India, Java, Mauritius, New Hebrides, Philippines, Raratonga, Samoa, South America, and the West Indies.

### Nature of Injury.

The damage to the banana plant in the case of this species is caused entirely by the grubs of the weevil borer feeding in the tissue of the attacked plant. (Plant 81.) The grubs hatch from eggs laid by the beetles, and in feeding in the bulb or corm of the banana plant they tunnel through the corm to such an extent, in the case of severe infestations, as to seriously weaken the plant. In its weakened condition both the quantity and quality of the fruit produced by the infested plant are very appreciably reduced, and thus the growers suffer very severe losses. This reduction in yield and quality is particularly noticeable when the plant is growing under unsuitable soil conditions, and is also much in evidence during an unfavourable season characterised by unusually low rainfall.

*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

PLATE 81.—BUTT OF BANANA PLANT ATTACKED BY BANANA WEEVIL BORER.

### Plants Attacked.

The banana weevil borer in Queensland has never been found attacking plants other than those belonging to some species of banana. The different varieties of cultivated bananas grown in this State—i.e., Cavendish, Dacca, Gros Michel, Lady's Finger, Plantain, and Sugar—do not appear to differ in any degree with respect to their susceptibility to attack.

### Life Cycle Stages.

The usual four life-cycle stages are met with in this pest—namely, the egg, grub, pupa, and adult. The egg is the stage of incubation, the grub of active feeding and accompanying rapid growth, the pupa of transformation, and the adult of reproduction.

The elongate oval egg (Plate 82, fig. 1) measures roughly $\frac{1}{12}$ inch in length and is pearly white in colour when first laid; as the incubation period advances certain changes, however, can be noted in its colour, but these changes need not be dealt with in the present notes.

The full-grown grub or larva (Plate 82, fig. 2) measures about $\frac{1}{2}$ inch in length and is normally distinctly curved in appearance. It is a somewhat bulky object with a creamy-white body and a reddish-brown head. Other features worthy of mention are the fact that it is legless, and that certain of its body segments are very much swollen, thus giving it the bulky appearance already mentioned.

The pupa (Plate 82, fig. 3) is about the same length as the grub, which it also closely resembles in colour when newly formed. Even a casual examination of this stage of the insect's life cycle will disclose the fact that the wings and legs of the future beetle are distinctly visible in the pupa.

The adult (Plate 82, fig. 4) is a typical weevil possessing a very prominent trunk or proboscis. It is black in colour, measures roughly $\frac{1}{3}$ inch in length, and, like many weevils, its skeleton or outer shell is extremely hard.

### Life History and Feeding Habits.

The eggs of this beetle are laid singly, the spot chosen for egg-laying being in the plant at or near ground-level. A small curved chamber is formed in the plant tissue by the female beetle, and therein the pearly-white egg is deposited. The incubation period of the egg varies, but according to Froggatt it may be regarded as averaging eight days during the warmer months of the year; in midwinter, however, the incubation period has been prolonged to as many as thirty-six days.

It is worth while mentioning the fact that egg-laying in the case of this weevil occurs right throughout the year but with varying intensity, the maximum activity in egg-laying being displayed in spring and autumn.

On hatching from the egg the grub commences its career of destruction, and if an infested corm is examined it will frequently be found to be tunnelled through and through, this tunnelling being accompanied by the evil effects already referred to in an earlier paragraph, namely, a serious reduction in the quantity and quality of the fruit produced. This honeycombing of the corm would not, of course, be the work of one grub; as many as thirty-five grubs have been found in a single corm.

FIG. 1.

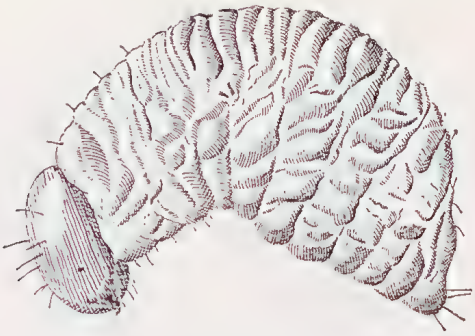

FIG. 2.

FIG 3.

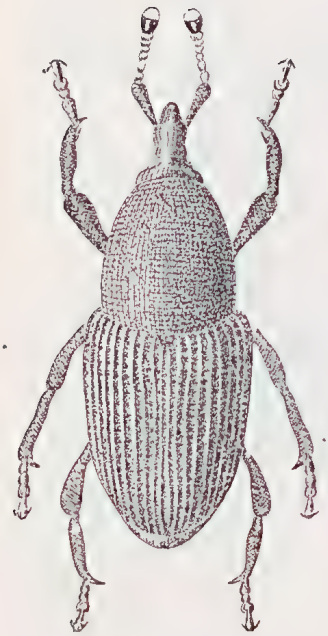

FIG. 4.

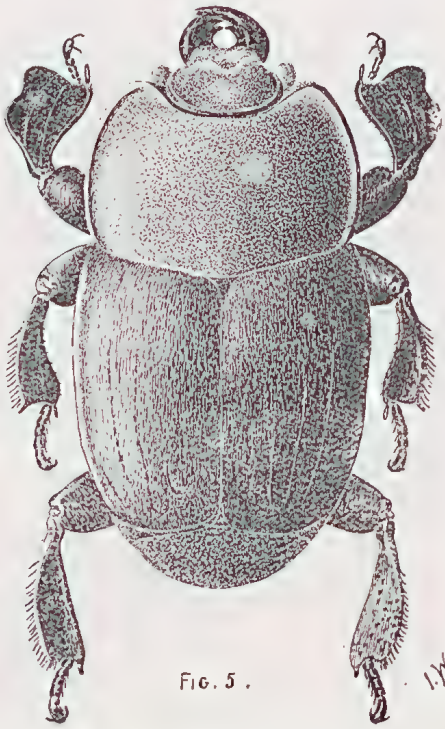

FIG. 5.

PLATE 82.—THE BANANA WEEVIL BORER (*Cosmopolites sordida* Chev.).

Fig. 1, Egg. Fig. 2, Larva or Grub. Fig. 3, Pupa. Fig. 4, Adult Borer. Fig 5, Adult of *Plæsius javanus*, predator on the Borer. Magnified 4 diameters.

It has generally been found that, in the case of banana weevil borer infestation, the attack is confined to the underground portion of the plant and to but a few inches above ground-level; however, in cases where the stem has been left standing after the cutting of the bunch that it has thrown, infestation of the stem may be very extensive, and indeed it may be attacked throughout practically its whole length.

The grub continues feeding within the tissue of the plant for some considerable time, the actual duration of this stage, as indeed is the case in all the others, being influenced very greatly by the prevailing temperature. Froggatt has found that in summer growth may be completed in two weeks, whereas in winter quite twenty-three weeks may be required for the completion of this stage in the insect's development. During its period of growth the grub moults several times, moulting being necessitated by the fact that the skin of insects does not grow but will only stretch to a limited extent. When its growth is on the verge of completion the grub diverts its tunnel towards the outside of the corm, so that there may be but a very slight barrier between the newly formed beetle and the outer world.

The grub then transforms to the pupa at the end of its feeding tunnel, and it does so without forming the fibrous cocoon that is so frequently present in this type of beetle. The usual transformation processes take place, and as a result thereof the beetle or weevil appears in a little over a week. Here again there is some considerable variation, for in winter as many as eleven days have been spent in the pupal stage, whereas in summer it has been as short as four.

The period that elapses between the laying of the egg and the emergence of the beetle is somewhere in the vicinity of seven weeks on an average, but, as already indicated in the discussion of the various stages of the life cycle, that figure fluctuates very considerably with such factors as temperature.

The newly formed beetle does not leave the pupal chamber for a few days but remains resting quietly therein hardening and darkening its skeleton, and having done so it then eats its way out into the soil, feeds, mates, and thus reproduces its species and commences a new life cycle.

## Control Measures.

The life history as outlined above should clearly indicate that there is little hope of successfully employing either sprays or fumigants against this serious pest. All stages in its life cycle, except the weevil itself, are very securely entrenched behind a most effective barrier of plant tissue, and hence in employing artificial control measures attention must be confined to the beetle itself.

In practice it has been found that the beetles are attracted to baits, and it has further been demonstrated that the beetles so attracted will be killed if the baits are dusted with Paris green. If the two operations of trapping and killing are combined in this way, the very laborious business of regularly visiting the baits and killing the beetles that have been attracted thereto will be eliminated.

Suitable baits are supplied by the banana plant itself, and growers wishing to combat this pest by baiting have a choice of several systems.

Portions of the corm may be cut off and placed on the ground either inside or close to the banana stool. The freshly cut surface of

the sliced corm is dusted with Paris green, which has previously been diluted with flour at the rate of one part of Paris green to six parts of flour. The slices of corm treated as described are then placed in position with the dusted surface downwards and are covered with trash. The object in covering the baits with trash is partly to produce the degree of darkness that is so attractive to the beetles and partly to prevent unduly rapid drying out of the baits which would thus become relatively unattractive.

PLATE 83.—BANANA FRUIT SHOWING "RUST" DUE TO THRIPS ATTACK.

A second system that is much in favour consists of cutting out a plug of tissue in old butts by means of the sucker pruning blade. The cavity thus formed is dusted with the poison mixture and the plug is then replaced. The cut surface of the old butt is also dusted.

The third system of baiting is the one that is at present most in favour, and it consists of dusting the freshly cut surface of the old butt after a deep groove has been cut therein by means of a cane-knife. The whole of the cut surface as well as the wedge-shaped piece of tissue removed from the groove is dusted with the poison mixture, and the wedge is then replaced in the groove.

In the experimental work conducted by Froggatt in connection with the control of this pest, numerous poisons were tested out in

conjunction with the baits. Very appreciable kills were obtained with quite a number of the substances employed, but it was found that Paris green was the most satisfactory of those handled, firstly because it gave a very high percentage of mortality and secondly because it was very rapid in its effects. Hence the Department strongly recommends its use as the most suitable poison to employ in conjunction with the baits.

Attention has so far been confined to the prospects of controlling this pest by the use of poisoned baits, but that is by no means the only weapon available in the campaign against the banana weevil borer, for strict observance of plantation hygiene will be productive of decidedly beneficial results.

Plantation hygiene necessitates the digging out of badly infested stools. Such stools are no longer profitable, and as they merely serve to intensify infestation their loss will not be felt by the grower. Where a stool is but slightly infested, the treatment required is not nearly so drastic and it will be sufficient if the old corms are removed. These corms should be carefully sliced up into thin pieces and any stems removed should be chopped in half.

Stems from which the bunches have been cut should be chopped off close to the ground, and then split in halves in order to facilitate the rapid drying out and decay of the tissue, which will thus be rendered unattractive to the borer.

### Prevention of Infestation.

It has been demonstrated that the most frequent means by which new plantations become infested with the banana weevil borer is through the use of infested suckers in planting up such new areas. Infestation may also occur by beetles being carried down in flood waters from higher infested levels to lower uninfested areas, and also by beetles crawling in from an adjacent badly infested plantation. Flight also plays some part in the dispersal of this pest, but it is at present regarded as playing only a very minor part in infestation.

Flight cannot be controlled, and obviously little can be done in dealing with flood waters, hence efforts to prevent infestation or intensification of infestation must be largely confined to dealing with imported suckers and the crawling beetles.

To deal with the possibility of infestation in imported suckers, the following departmental recommendations have been made. Firstly, the digging of suckers or corms should each day be restricted to the quantity that can be planted the following day. Secondly, every corm or bulb that has been dug out should be carefully examined for traces of borer infestation, and it has been found that this is best accomplished by carefully paring off a thin slice of plant tissue. It is desirable that this slice be removed as far up as it is practicable to do so without inflicting injury to the eye. Paring off this thin slice will accomplish a twofold object; firstly it will eliminate any eggs that may have been laid in the corm, and secondly it will expose borer tunnels that may be present. All corms showing the presence of borer tunnels should be destroyed. Finally, having selected the suckers in accordance with the preceding recommendations, these should be placed on a cart or slide and removed to the new area with the least possible delay. If they are allowed to remain overnight in an infested plantation, the precautions of paring

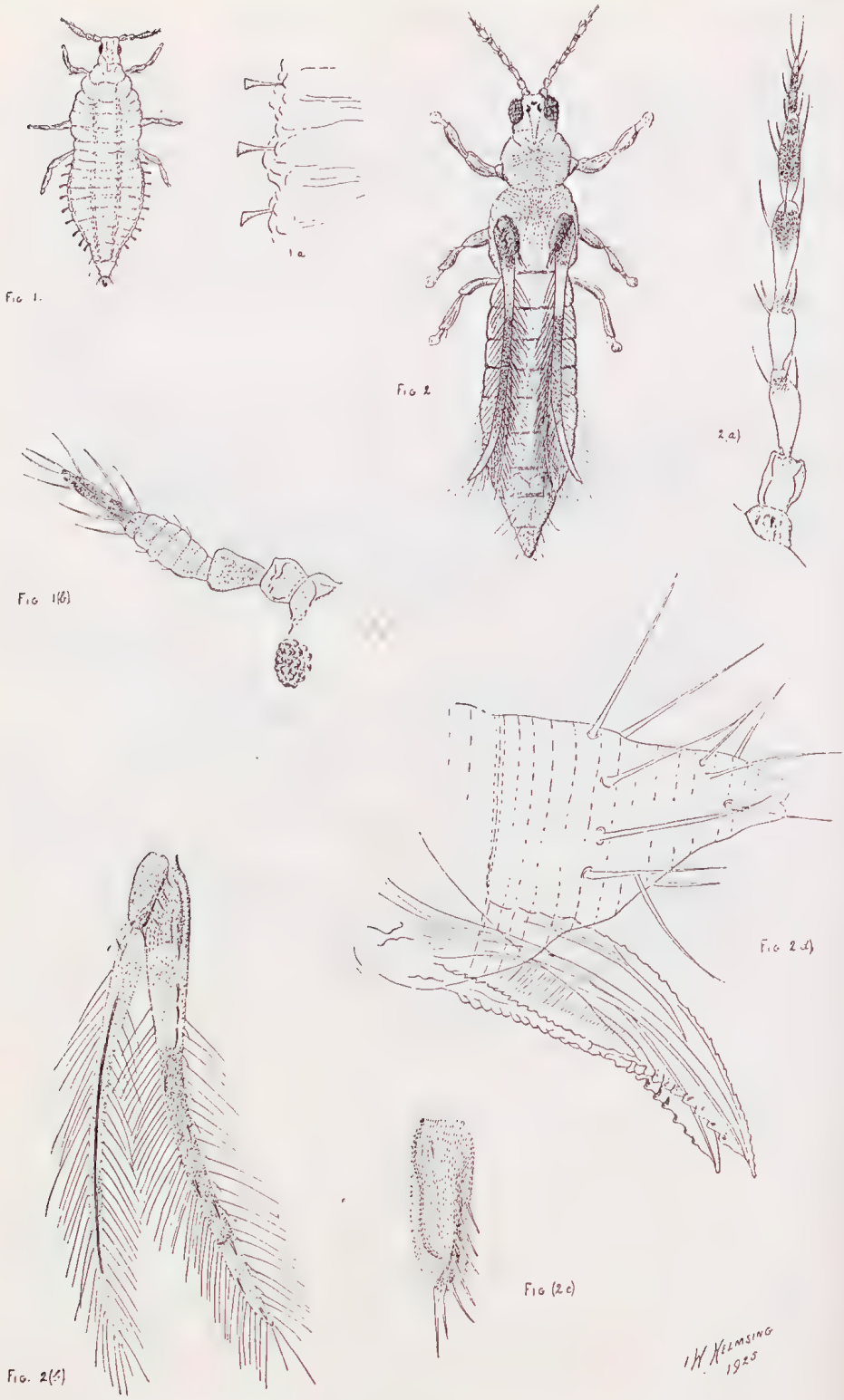


PLATE 84.—THE BANANA THRIPS (*Scirtothrips signipennis* Bagnall).

Fig. 1, Larva, × 45. Fig. 1*a*, Portion of side of abdomen of larva, × 210. Fig. 1*b*, Antonna of larva, × 210. Fig. 2, Adult female, × 45. Fig. 2*a*, Antenna of adult female, × 210. Fig. 2*b*, Wings of female, × 90. Fig. 2*c*, Scale over base of wings, × 180. Fig. 2*d*, Apex of abdomen of female, showing saw-toothed ovipositor, × 295.

and destroying tunnelled corms will in all probability be rendered of little value by reinfestation of the suckers while waiting overnight for removal.

The danger of heavy infestation of clean new areas adjacent to old infested ones is very appreciable, and if such sites have to be selected for new banana plantations it is desirable to lay rows of baits between the new and the old areas, in order to minimise as far as possible the migration of beetles from the one to the other.

The policy to be adopted in the fight against the banana weevil borer may be summarised by saying that the chief objective is firstly to endeavour to keep new areas clean by adopting the precautions already detailed, and secondly, when infestation has occurred, to endeavour to minimise its effects by baiting the beetles with Paris green.

### Possibility of Biological Control.

The Department of Agriculture and Stock has devoted a considerable amount of attention to the possibility of controlling this pest by the introduction from overseas of some of its natural enemies. Between the years 1921 and 1926 a number of colonies of the predatory Histerid beetle *Plæsius javanus* Er. (Plate 82, fig. 5) were introduced from Java and liberated on suitable plantations in Queensland. Definite evidence of the establishment of that beneficial insect has not yet been obtained.

More recently Froggatt visited Java and inquired into the whole question of the control of the banana weevil borer in that country, paying particular attention to its control by natural enemies. Arising out of that visit, further large colonies of *Plæsius javanus* were imported to Queensland and are at present being handled in captivity in quarantine. Colonies of a predaceous Leptid fly, *Chrysopila ferruginosa* Wied., were also obtained, and after undergoing the usual quarantine period a colony of this beneficial insect was liberated in the Cooran district.

It should be clearly understood that, in the case of this pest, the biological control work is still in the experimental stage, and, even if the two insects just discussed should become permanently established in this State, some considerable time, extending into several years, must elapse before there is any possibility of their becoming sufficiently numerous and widely distributed to appreciably reduce infestation. Growers are therefore urged to continue to carry out the control measures recommended in earlier paragraphs. They can rest assured that, should the present experimental work in biological control show signs of success, they will be immediately advised to that effect.

## The Banana Thrips.

The banana thrips (*Scirtothrips signipennis* Bagnall) is a very small and insignificant insect which has for many years been responsible for the serious banana-skin condition known as "rust" or "colour." Centres of infestation occur in various localities in coastal Queensland, from Cairns in the far north to banana-growing districts south of Brisbane. In recent years particularly serious outbreaks have occurred in the Innisfail and Gympie districts.

### Nature of Injury.

The term "rust" has been applied to attacked bananas because of the characteristic injury produced by the feeding of the larval and

FIG. 1 × 225

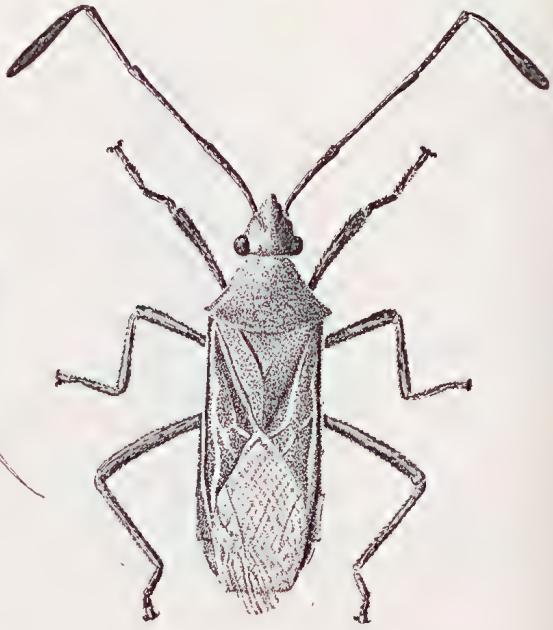

FIG. 2 × 4

FIG 3 × 1½

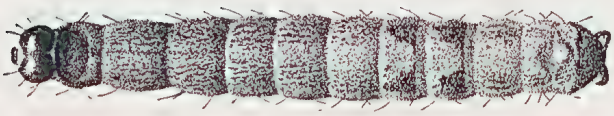

FIG 4 × 1½.

PLATE 85.

Fig. 1, Anal segments of male of *Scirtothrips signipennis* Bagnall, showing genitalia, × 225. Fig. 2, Imago, *Pendulinus fuscescens* Dist., × 4. Fig. 3, Larva, *Tiracola plagiata* Wlk., × 1½. Fig. 4, Imago, *Tiracola plagiata* Wlk., × 1½.

adult thrips on the skin of the fruit. Infestation commences at points of contact on the fingers, particularly at the base of the hand. The injured fruit then acquires a typical reddish-brown appearance with a somewhat roughened surface (Plate 83). This discoloration and roughening of the skin may be confined to a relatively small area at the base of the hand, but in severe attacks it may involve practically the whole of the skin of the fruit. Furthermore the skin may subsequently become quite extensively cracked. Where infestation has not been unduly severe, thrips attack does not render the fruit less palatable, although it undoubtedly gives it a much less attractive appearance and thereby appreciably reduces its market value. When the whole surface of the fruit or the greater part thereof is involved in severe discoloration and roughening, the quality of the fruit is, however, decidedly impaired, and cracked fruit with exposed pulp is obviously unsuitable for marketing.

## Life Cycle Stages and Life History.

The very small eggs of the thrips are laid in the skin of the fruit, generally in tissue on which colonies of the adults have established themselves where the fruit are touching at the base of the hand. Egg-laying takes place in punctures made by means of the saw-toothed ovipositor with which the female is equipped (Plate 84, fig. 2d.) Eggs are similarly deposited under the leaf-sheaths, where adults also very frequently form colonies. According to the life-history studies carried out by Girault, these eggs hatch after an incubation period of about a fortnight, which is surprisingly long in view of the fact that the duration of the subsequent larval and pupal stages is only about one week in each case.

The larvæ on hatching out feed in colonies in association with the adults, these colonies as already indicated being found beneath the leaf-sheaths and on the fruit at various points of contact. The larvæ become full-grown in about a week and are then about $\frac{1}{25}$ inch in length and are white in colour. They pass through the usual series of moults; a young larva is illustrated on Plate 84 in figure 1.

The full-fed larva pupates either on the plant or in the soil and a week later the winged adult appears (Plate 84, fig. 2). The adult is a delicate yellow insect bearing two pairs of typically fringed wings; in size it is very slightly larger than the full-grown larva.

Thrips infestation may be observed in every month of the year, but it is at its lowest ebb during the winter months. With the approach of warmer weather in September, numbers increase appreciably, and the peak of infestation is reached in January and February.

## Control Measures.

Before considering the question of the control of this pest when it actually occurs on a plantation, it is perhaps desirable to point out the necessity for taking every precaution to prevent its establishment where that has not already taken place on a plantation. With this object in view, suckers, if they have to be brought in from another plantation, should where possible be obtained from one in which thrips do not occur. Infestation is now, however, so widespread throughout coastal Queensland that it will be difficult indeed to find a "rust"-free plantation from which to draw supplies. Hence most growers will have to obtain their supplies of suckers from infested plantations. When doing so, the soil

PLATE 86.—DAMAGE CAUSED BY FRUIT-SPOTTING BUGS.

on the bulbs should be removed as thoroughly as possible, and they should then be pared so as to remove a thin slice of tissue. Finally the top should be removed as close down as possible. A question that has frequently been raised is the possibility of dipping suckers in a solution that will kill the thrips and thus ensure a supply of clean suckers. There are, however, a number of difficulties which appear to render such a desirable procedure impracticable, at least in the present state of knowledge.

Where infestation occurs attention should be paid to plantation hygiene, and, as in the case of banana weevil borer infestation, stems from which bunches have been cut should be chopped down close to the ground, and then split open to hasten the drying out of the tissue, which will thus cease to be attractive to the thrips for feeding or breeding. The removal and destruction of tip fruits is also desirable for similar reasons. Hoeing in the vicinity of the banana plant will lead to the exposure and destruction of pupæ and newly transformed adult thrips, and will thus be productive of much good.

Finally consideration must be given to the possibility of effectively controlling this pest by the use of insecticides. Pyrethrum powder mixed with sifted wood ashes in equal portions was tested as a dust in the 1924 investigations, 1 lb. of the pyrethrum being sufficient to dust 230 bunches. Girault recommended that the treatment be repeated at least four times at intervals of nine days. In 1926 Froggatt carried out field trials in the Innisfail and the North Coast districts, to test the value of calcium cyanide dust, in the hope of obtaining a more deadly dust with the power of rapidly killing practically the whole thrips population on dusted bunches. A very high percentage of kill was obtained and no damage was done to the treated fruit. Banana-growers in some cases have, however, complained of injury to treated fruit, and accordingly further field trials have recently been instituted to place the insecticidal treatment of this pest on a thoroughly satisfactory basis.

### Fruit-spotting Bugs.

In the Byfield section of the Rockhampton district, considerable losses have been caused by the feeding of two species of bugs, namely, *Pendulinus fuscescens* Dist. (Plate 85, fig. 2) and *Pendulinus lutescens* Dist. These Coreid bugs attack the fruit, and as a result very characteristic dark, circular, depressed areas are formed in the vicinity of the feeding punctures on the skin of the injured fruit (Plate 86). At the centre of these depressed areas there is a pronounced raised spot. Fruit at all stages of maturity may be attacked, but the results of the puncturing vary in their intensity. If the fruit is attacked while it is still very small, the skin will generally split across the centre of the depression surrounding the original puncture (Plate 87), and such fruit is obviously of little or no value for marketing. Splitting does not take place when the attack is confined to more mature fruit, and the infestation consequently is not quite so serious in its effects, although it is without doubt at least a serious blemish that renders the fruit unattractive in appearance.

The injury to fruit is inflicted by both the nymphs and the adult bugs, and is most pronounced in late summer and autumn. *Pendulinus lutescens* Dist. is thought by Froggatt to be the more destructive of the two species. It occurs at many centres throughout coastal Queensland,

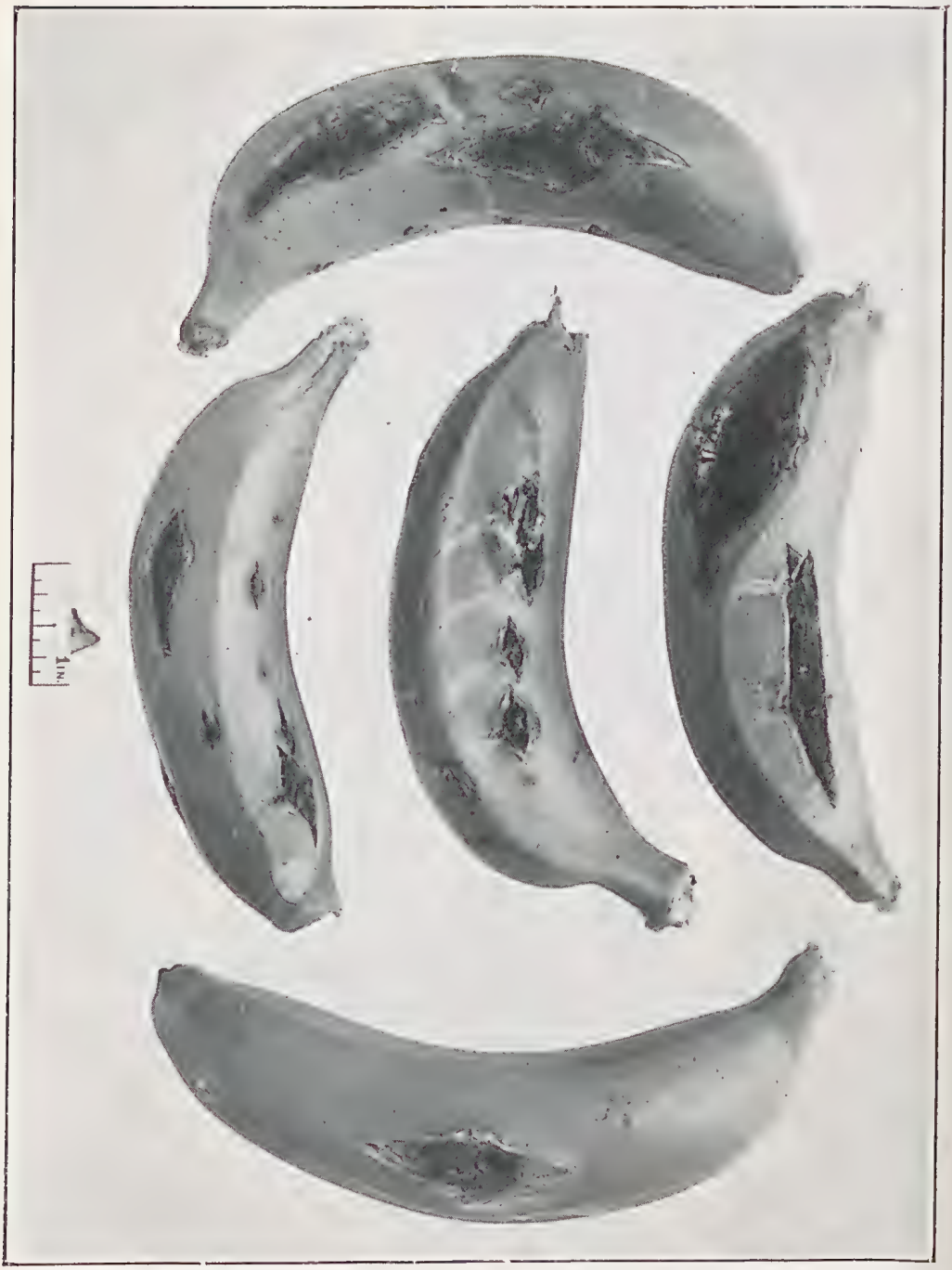


PLATE 87.—DAMAGE CAUSED BY FRUIT-SPOTTING BUGS.

ranging from Cairns in the North to Brisbane in the South. It is therefore rather curious that its destructive activities should have caused concern in only one banana-growing district in the State. Fruit showing apparently identical injury has, however, been seen in small quantities in the Glastonbury section of the Gympie district. It is, of course, impossible to say whether the Glastonbury fruit was attacked by the species now under discussion or by some other bug.

### Control Measures.

Little definite information can at present be given with respect to the control of these pests, and they should accordingly form the subject of an investigation whenever a suitable opportunity occurs for doing so. Sharply jarring the bunch, over the lower portion of which a bag of mosquito netting has been previously slipped, will cause the immature nymphs to fall into the trap thus formed, and also induce the adults to fly downwards into the netting. The bugs collected in this manner can then be subsequently destroyed, and it may be that such a method of attack will prove sufficiently effective to be economically practicable. In the absence of anything better it is at least worthy of a trial on infested plantations. Any field investigation that is carried out should also test the possibility of successfully using stockinet covers to protect the fruit from attack. Preliminary evidence in favour of this procedure has already been obtained.

Some attention has been given to alternative host plants of these bugs, and when their host relationships are more fully known some useful information may be available on which further effective control measures can be based.

## Fruit-eating Caterpillars.

Several species of fruit-eating caterpillars attack the skin of the fruit, while some feed first on the skin and subsequently penetrate to the pulp, on which they then feed. The skin erosion at best gives an unattractive appearance to the fruit, and if it is followed by cracking the fruit becomes valueless. Where the pulp is attacked the fruit is of course a total loss.

Quite a number of species of caterpillars are responsible for this type of damage, and in some seasons one species at least may be so abundant as to inflict very severe losses. Such an epidemic occurred in 1927, when enormous numbers of the caterpillars (Plate 85, fig. 3) of the Noctuid moth *Tiracola plagiata* Wlk. (Plate 85, fig. 4) migrated from the weeds on which they were feeding on the edges of the banana plantations. They then attacked the foliage and fruit of the bananas, and in the course of a few weeks they inflicted very severe losses on many plantations (Plate 88).

Where there is evidence of the recurrence of such an attack, serious consideration might be given to the use of poison bran baits, which would intercept at least a very large proportion of the caterpillars before they reached the bananas. The migrating caterpillars that fed on the bran baits scattered on the ground would rapidly succumb to the effects of the Paris green contained in the baits. The preparation of these baits is discussed in the chapter dealing with insecticides.

PLATE 88.—DAMAGE CAUSED BY FRUIT-EATING CATERPILLARS (*Tiracola plagiata* Wlk.).

## Banana Fruit Fly.

Several fruit flies attack bananas in this State, the species that is entitled to the unwelcome distinction of being called "the banana fruit fly" being *Chætodacus musæ* Tryon (Plate 89). This fly appears to be responsible for the injury to bananas grown north of Cardwell, and from that district right up to Cairns it may be regarded as a pest of some importance. In Southern Queensland fruit-fly infestation is caused by the Queensland fruit fly (*Chætodacus tryoni* Froggatt) and the boatman fly (*Rioxa musæ* Froggatt), most of the injury being inflicted by the first-mentioned species. Fruit-fly losses in the Southern banana-growing districts are, however, of but very slight importance, largely because the Queensland fruit fly, the chief culprit in Southern areas, generally confines its attacks to mature fruit produced in summer. The banana fruit fly, on the other hand, has frequently been found by Froggatt attacking immature fruit that is only two-thirds developed, and hence it assumes some considerable degree of importance.

### Life History.

This pest lays its eggs (Plate 89, fig. 1) in the skin of the fruit, and the maggots (Plate 89, fig. 2) hatching therefrom feed in the pulp, thus producing disintegration of the tissue and rendering the fruit valueless. When full-grown the maggots leave the infested fruit and form their brown puparia (Plate 89, fig. 3) in the soil. The reddish-brown flies (Plate 89, fig. 4) subsequently emerge and carry on the work of infestation. Detailed information is not yet available with respect to the duration of the various life-cycle stages of this pest. It has been bred from the native banana (*Musa banksii*), but so far no other host records have been obtained, although efforts have been made to do so.

### Control.

The banana fruit fly has not been the subject of such detailed study as has been devoted to its relative the Queensland fruit fly, but nevertheless some information of value is available with respect to its control.

Firstly strict attention should be paid to plantation hygiene, and consequently all discarded or infested fruit should be collected and disposed of in such a manner as to preclude its giving rise to a brood of flies. The best means of attaining this object can be most appropriately determined on the plantation itself. Various means whereby infested fruit may be disposed of have already been discussed in an earlier chapter when dealing with the Queensland fruit fly.

A further useful procedure is to eliminate, so far as it is practicable to do so, all wild banana plants growing in or in the immediate vicinity of cultivated banana plantations. Unless these wild banana plants are destroyed they will quite undoubtedly serve to breed up flies to infest the fruit on which the banana-grower depends for his existence.

For many years stockinet has been used in North Queensland to protect the banana bunches from fruit-fly infestation. This procedure is quite effective, and furthermore it is economically practicable. The stockinet is made in a tubular form suitable for covering the bunches, and its use could be enthusiastically recommended but for one factor, namely its apparent tendency to aggravate thrips infestation. Hence, if stockinet is used to prevent fruit-fly infestation, extra precautions

FIG 1 × 6

FIG 2 × 6

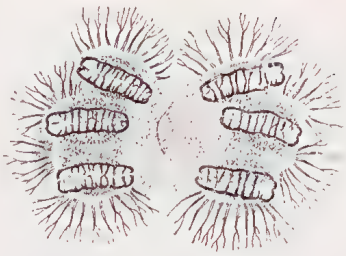

FIG 2A × 210.

FIG 2B × 30

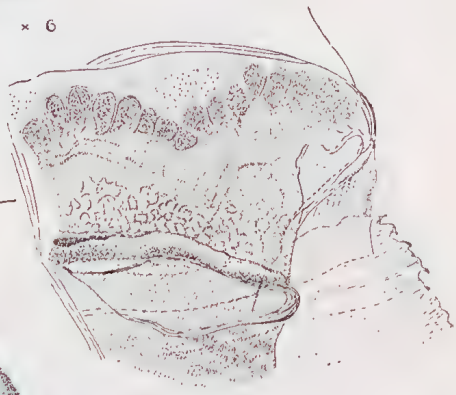

FIG 2C × 210

FIG 3 × 5

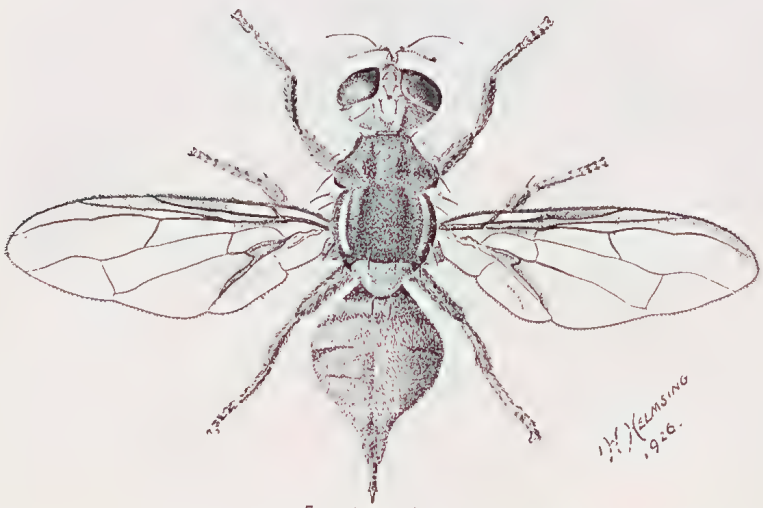

FIG 4 × 6

PLATE 89.—THE BANANA FRUIT FLY (*Chætodacus musæ* Tryon).

Fig. 1, Eggs, × 6. Fig. 2, Larva, × 6. Fig. 2A, Stigmal discs of larva, × 210. Fig. 2B, Jaws of larva, × 30. Fig. 2C, Anterior spiracle of larva, × 210. Fig. 3, Puparium, × 5. Fig. 4, Imago, × 6.

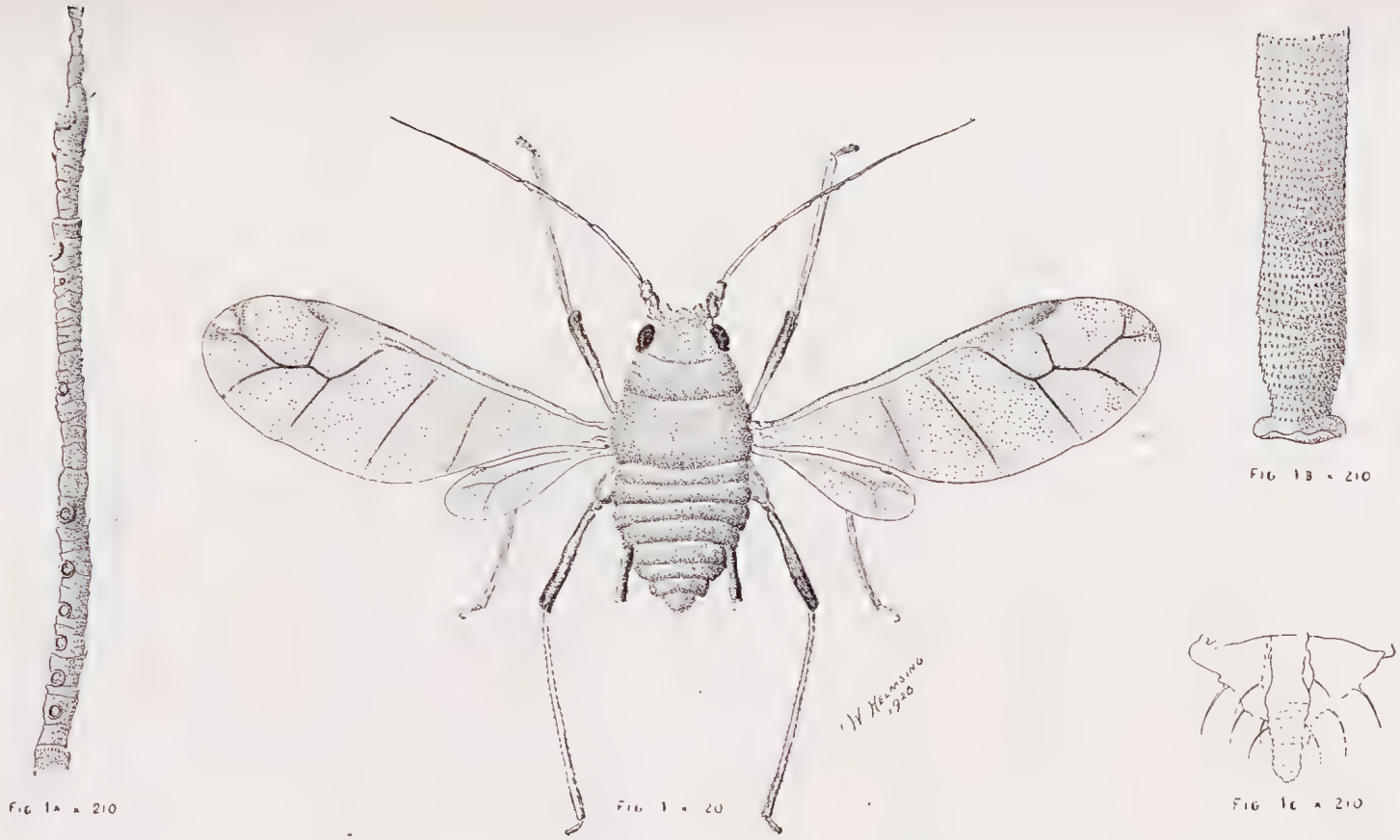


PLATE 90.—THE BANANA APHIS (*Pentalonia nigronervosa* Coq.), THE CARRIER OF THE BUNCHY TOP VIRUS.

Fig. 1, Winged adult, × 20. Fig. 1A, Segments 3 and 4 and portion of 5 of antenna of adult, showing sensory organs, × 210. Fig. 1B, Cornicle of adult, × 210. Fig. 1C, Anal segment of adult, × 210.

must be taken to keep the thrips population within reasonable bounds. Once a thoroughly effective thrips insecticide is available which will be safe for use by the ordinary banana-grower under average plantation conditions, and it can be applied in conjunction with the covering of the bunches, then the interdependent problems of thrips and fruit-fly control will have been solved.

### The Banana Aphis.

The species commonly known as the banana aphis, *Pentalonia nigronervosa* Coq. (Plate 90, fig. 1), occurs practically wherever bananas are grown in this State. Large colonies of this insect may be seen underneath the leaf-bases and in the throat of the plant, and it may be seen in smaller numbers on the fruit and foliage. Furthermore, it may be found in very considerable numbers at the base of the stool beneath ground-level.

This insect feeds by sucking the plant sap, but it is not considered that its presence is of any practical consequence in districts where bunchy top does not exist. Where that disease occurs, it, however, immediately becomes of first-class importance on account of the part it plays as the insect agency whereby the disease is transmitted from an infected plant to a healthy one. Bunchy top is later discussed in some detail in this chapter.

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## KILLING OF WEEDS WITH ARSENICAL SPRAYS.

By J. C. BRUNNICH.

Enquiries are frequently made about the use of arsenical sprays for the killing of weeds. There are several arsenical weed killers on the market, which can be used for this purpose, or anyone can make his own solution by the following method:—

Mix 4 lb. of grey arsenic with 1 lb. of caustic soda in the dry state, and slowly add water to make 4 gallons of a concentrated solution. Sufficient heat is generated in the process to bring the solution almost to boiling point. If washing soda is used instead of caustic soda 4 lb. are required, which are dissolved in about 3 gallons of water, which is brought to the boil and the 4 lb. of arsenic are added, and the solution kept boiling until all the arsenic is dissolved, which generally takes about half an hour, when sufficient water is added to make 4 gallons.

For the spraying dilute 1 pint of this concentrated solution with 4 gallons of water. From 75 to 100 gallons of the spraying solution are required per acre. The spray is only successful for the destruction of succulent weeds in their early stages of growth.

For the destruction of prickly-pear, instead of grey arsenic, at present arsenic pentoxide, supplied by the Prickly-pear Commission at cost price, is largely used, and this may be successfully employed for killing of weeds generally, and has the great advantage that it can be dissolved in water without the use of soda.

The Bureau of Sugar Experiment Stations made experiment with arsenical sprays in the Mackay Sugar Experiment Station in 1915, and found that weeds like pigweed, billy goat weed, asthma weed were practically killed with one spraying; grasses like couch grass and cocksfoot could not be killed even with repeated sprayings at short intervals. The cost of one spraying was about £1 per acre on the headlands, and nearly £2 per acre amongst the cane rows.

When preparing and using arsenical sprays, great care must be taken that the fumes when boiling the solution should not be inhaled, and allowing boots, socks, and clothing generally to become sodden with the arsenical solution will lead to serious illness. Before taking any meal the hands must be carefully washed, and also the whole body should be washed as frequently as possible in intervals between the spraying operations, as the poison is readily absorbed through the open pores of the skin.

The risks of using such poisonous sprays in banana plantations and sugar-cane fields are so great that the Department of Agriculture and Stock does not recommend the general use, and only in a few exceptional cases the use of arsenical sprays is justified and economic.

# THE ROYAL NATIONAL EXHIBITION.

THE BIGGEST EVENT OF QUEENSLAND'S YEAR—A REFLEX OF RURAL DEVELOPMENT AND AN EPITOME OF INDUSTRIAL PROGRESS—A COMPLETE REPRESENTATION OF THE AGRICULTURAL ACTIVITIES OF THE STATE—EVERY EXHIBIT AN EDUCATION AND EVIDENCE OF SKILL, WILL, AND ACHIEVEMENT—A TRIUMPH OF EFFECTIVE ORGANISATION—A LESSON, LASTING IN ITS VALUE, OF THE PRACTICAL CO-OPERATION OF THE PRIMARY PRODUCER WITH THE CRAFTSMAN, THE MANUFACTURER, THE ENGINEER, THE SCIENTIST, AND THE ECONOMIST.

**Once again the Brisbane Show, held on 12th August and following days, presented impressive proof of the fecundity of the Commonwealth's richest province. It reflected Queensland's immense resources and the great work of our country people in their development.**

**Regarding the Exhibition as a microcosm of the whole State, presenting an extraordinary range of rural production and diversity of rural interests within its borders, it is difficult to place a limit on any estimation of future progress. It showed how early promise has already ripened into fulfilment; and revealed a vista of vastly greater achievement in the years to come.**

**Our major and most of our minor industries, as well as their tributary enterprises, were represented at Bowen Park, where huge daily crowds saw, appraised, and appreciated the extent to which Queensland depends on primary production.**

**It is said, and very truly, that a visit to the Brisbane Show is one of the best cures for pessimism. This annual event is a breeder of optimism as well as an exemplar of opulence, and anyone who observed, on the opening day, the general air of prosperity of the hundred thousand Queenslanders gathered in the pavilions and around the arena; who studied their work of brain and hand so well displayed; and who realised that only the edge of opportunity, provided by lavish natural endowment, is as yet exploited, could not fail to feel a quickened faith in Queensland's future.**

**The Show again presented impressive evidence of how town and country are linked in industry; how the application of sound principles work out in modern farming practice; how stock can be improved by selection, breeding, and feeding; of the extent to which the engineer assists the agriculturist; and how essential science is to our daily life and work.**

BRILLIANTLY fine weather favoured the Royal National Association for its 1929 Exhibition, which was opened officially by His Excellency the Governor, Sir John Goodwin, accompanied by Lady Goodwin, on Wednesday, 14th August, in the presence of nearly a hundred thousand people, including His Excellency the Governor-General (Lord Stonehaven) and Lady Stonehaven, and many more notable visitors from other States.

To describe the Show in a single sentence, it was an exhibition of Australian industry running on ball-bearings. It was also a demonstration of Queensland's prosperity, and of the energy, skill, inventive ability, and organising powers of the people who are doing the real work of the State—whether in production, construction, administration, or social services.

PLATE 91.—THE GRAND STOCK PARADE.

### A Fountain of Progressive Ideas.

The Royal National Association has the good fortune to have big men at the head of its affairs. It is, therefore, a fountain of progressive ideas, and a strong educational force; and no one will deny its importance as a contributor to our national welfare. It stands for better farming, better stock, better business, better public service, and bigger returns for the man on the land. Another thing about the Association is that it is never guilty of taking a narrow view, nor of pessimism in any of its constrictive or depressing forms. With an overwhelming pride in the State and a confidence in its future it goes about its job with zeal and healthy optimism that are most commendable. The story of the Royal National Association was presented in concentrated form at its Fifty-fourth Annual Show.

To what degree its useful purpose to Queensland has been proved can hardly be realised adequately; to what extent it will continue to radiate its influence and how far it will develop its greatness as a factor in the brightening and prospering of country life can be imagined more readily, for is not the Brisbane Exhibition itself extraordinary evidence of the energy, the enterprise, the strength and vigour of rural industry that it is the Association's daily job to develop and upon which rests the soundness and the completeness of our national existence?

### Outstanding Displays.

Among the big pavilion displays was the Court of the Department of Agriculture and Stock. In it was staged a comprehensive and complete representation of all the agricultural activities of the State. Other outstanding indoor displays included the "Valley of the Giants," a realistic replica of a section of a satinay forest on Fraser Island; district exhibits, a class in which this year's competition was very keen; the "One Farm" efforts; the competitive entries in the agricultural produce section; and the rural and technical schools' array of examples of juvenile craftsmanship. Other excellent displays were those in the Meat Industry Hall, and of the Queensland Agricultural High School and College.

The Farm Boys' Camp was again a feature of the Show, and the suggestion has been made that the underlying idea of this successful plan for extending rural education might be adopted in regard to a similar camp at the Sydney Show for young Queensland farmers. The boys, who were chosen from among project club members, were the guests of the Royal National Association. School teachers all over the State are teaching the farmers of the future the value of scientific methods in every branch of husbandry, and are cultivating a genuine agricultural bias in the minds of bright young country people. They are showing, too, that scientific principles apply to grain improvement as well as to stock breeding, that agricultural science points the way to independence, and these fine lads saw object lessons in everything they viewed in their tireless quest for information.

In the Departmental Court the value of science in the paddock and in the dairy, as well as in the laboratory, was demonstrated again by experts who know their job and all its newest developments. The exhibits illustrated what can be done, and the Departmental demonstrators were in attendance to tell the farmer the best, cheapest, and quickest way of doing the work. Research results of official investigations into the many forms of animal and plant diseases were revealed, and to the man on the land it was made plain that, to-day, science is just as essential as the plough and the harrow.

The stock this year well illustrated the advance Queensland has made in animal husbandry, and it is doubtful if livestock of a higher standard could be paraded at any other Australian show. With the dairy cows it was a case of beauty and the bucket, and both were winners—a happy combination of cream-can value and showring shapeliness.

In the machinery section every exhibit was a pointer to industrial prosperity along the modern mechanical road.

Generally, a whole world of activity revolved around the Exhibition ground, and behind it all—behind the artistically arranged galleries and galaxies; behind the attractive trophies of cereal and other crops, and the colorful array of citrus and other fruits; behind the animals in the stalls and in the arena; behind all the marvellous collections of modern mechanism; behind the bustle of the whole business—there was the work of the farmer, the economist, the scientist, and the technician; and at the back of all was our great system of national education that, though by no means perfect, is already producing the fruits of hard-won and well-deserved success.

PLATE 92.—THE VICE-REGAL PARTY INTERESTED IN THE RING EVENTS.
From right to left: Lady Goodwin, Sir John Goodwin, Mr. Ernest Baynes, and Lieut.-Colonel L. E. C. Worthington-Wilmer.

### A Queensland Institution.

There is another side of the Brisbane Show, and that is its social value—the annual gathering of producers from every district in the State's immense territory, from its furthermost boundaries, and beyond. For them it provides a clearing-house for a year's experiences and a forum for friendly argument.

Thus the Brisbane Exhibition goes on from success to success, breaking yearly every entry and attendance record. This Queensland institution, for it is nothing less, is one of the most impressive signs of our agricultural advance. It gives us something more than encouragement; it gives us the inspiration that comes from the other man's success. We realise, for instance, that the farmer who never tests his herd or conserves a ton of fodder is hopelessly out of date—for there is the evidence before us, the evidence of the Exhibition itself, that better husbandry means better business and bigger cheques; the evidence of co-operation in industry; the evidence of the common sense of mutual aid which when fully applied will lighten our common tasks, ensure our common good, and add immeasurably to our common wealth.

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## THE OPENING CEREMONY.

SIR John Goodwin said that it was a very great pleasure indeed for both himself and Lady Goodwin to be present at the Show. Every year they looked forward to the Brisbane Exhibition, and were always delighted to attend. They met so many friends from the country, and they saw so many magnificent exhibits that it was one round of delight from start to finish. He was particularly pleased with this year's show, for which there was a very large increase of exhibits displaying quality as well as quantity all round. There was a general improvement in the show in every direction—in buildings, exhibits, and what had been carried out to increase the comfort of both exhibitors and public. There were many exhibits which he had not seen, though he had been present each day. This indicated that he had not been altogether idle. As he had not seen every exhibit, he would not make many remarks concerning them generally. He thought that anyone coming from England, or for that matter, from any country in the world, who walked round the show and saw the dairy cattle, the meat, district, and farm exhibits could not be but impressed, and could not but hold the honest opinion that this show could compare more than favourably with any show in the world. It was not merely an exhibition carried on by the Royal National Association but something that fulfilled many other purposes. In his opinion it was one of the most educative factors in the State. The Association was carrying out an immense service to the people of Queensland not only in the present but also for the future. He congratulated the Association most sincerely on what it had accomplished, and for the untiring work all connected with it had put in and for their unceasing efforts to carry out improvements in the interests of the pastoralists, agriculturists, and people generally. He had much pleasure in declaring the show open.

The Vice-Regal visitors were welcomed by Mr. Ernest Baynes (President) on behalf of the Council and members of the Royal National Association.

Included in the gathering besides the Governor of Queensland and Lady Goodwin were the Governor-General of Australia, Lord Stonehaven, Lady Stonehaven; the Premier of Queensland, Hon. A. E. Moore; the Minister of Agriculture and Stock, Hon. Harry F. Walker; the Minister of Mines, Hon. E. A. Atherton; the Minister of Transport, Hon. Godfrey Morgan; the Minister of Labour and Industry, Hon. H. E. Sizer; the Minister of Education and Works, Hon. R. M. King; the Chief Justice, Hon. J. W. Blair; the Leader of the Opposition, Hon. W. Forgan Smith; the Mayor of Brisbane, Alderman W. A. Jolly; the President of the Royal National Association, Mr. Ernest Baynes; the Under Secretary for Agriculture and Stock, Mr. E. Graham; the Assistant Under Secretary, Mr. Robt. Wilson; the Director of Agriculture, Mr. H. C. Quodling; the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby; the Chief Inspector of Stock, Major A. H. Cory; the Director of Fruit Culture, Mr. Geo. Williams; the Chief Supervisor of Dairying, Mr. Chas. McGrath; the Agricultural Chemist, Mr. J. C. Brünnich; the Government Entomologist, Mr. Robert Veitch; Messrs. W. A. Affleck, J. P. Bottomley, and H. S. Cribb; the Secretary of the Royal National Association, Mr. J. Bain; and the Acting Secretary, Mr. H. W. Watson.

PLATE 93.—THE CENTRAL TROPHY IN THE DEPARTMENTAL COURT.

The practical results in grain improvement achieved by Departmental Plant Breeders were well illustrated in this exhibit, of which wheat and maize were the strongest features.

## THE COURT OF AGRICULTURE.

### REPRESENTATION AND REVIEW OF DEPARTMENTAL ACTIVITIES.

This year the Court of the Department of Agriculture and Stock was, as usual, a centre of great public interest, and the standard of excellence reached in the preparation and in the staging of the exhibits reflected very great credit on the officers responsible for a fine educational effort.

The activities of officers of the Agricultural Branch under the supervision of the Director of Agriculture, Mr. H. C. Quodling, were illustrated by two separate displays, one occupying the full width of the upper part of the court, and the other forming the main central trophy. The former presented a large and varied assortment of wheat, oat, and barley sheaves and grain drawn principally from Departmental experiment plots on the Darling Downs. In the preparation and staging of the sheaves the individual heads of each had been arranged in a series of "steps," giving an artistic effect. A close examination by the more practical-minded observer immediately inspired a feeling of optimism in the future of a country capable of producing cereals of such outstanding quality. The exhibit itself was so arranged that those who had the time to read the descriptive placards were impressed with the fact that the present-day producer of primary products must be a thinker, and one who, to be successful, must possess a knowledge of the underlying principles of cultivation, and with what may be termed the factors of production.

### CEREAL CROPS—NEW TYPES EVOLVED.

#### Wheat.

In juxtaposition was a display from the Roma State Farm of wheat ears mounted on screens, with relevant descriptions, to illustrate the work of wheat breeding, and of the way in which certain unit characters appear in subsequent plant generations. The significance of this highly technical work which is carried on by Mr. R. E. Soutter lies in the breeding, selection, and development of special varieties of wheat to suit Queensland conditions; the Roma State Farm crossbreds being subsequently passed on to officers of the Field Branch of the Department for further test in different districts, and these are carried out over a series of seasons to determine the better and more dependable varieties for commercial purposes.

#### Maize.

Prominence was given on the central trophy to maize and to the improvement work carried out by the Maize Specialist, Mr. C. J. McKeon, Instructor in Agriculture. Several varieties of maize formed the subject of this improvement work, and the standard of excellence attained was manifest in the quality, type, and uniformity of the grain exhibited. Methods of seed selection and improvement were set out on the trophy in such a way that a more intimate knowedge of this important factor in the improvement in the type and yield of crops might be readily acquired. As the Department makes a practice of raising quantities of seed each year for sale to farmers, every grower has an opportunity of purchasing improved seed equal in quality and productivity to that exhibited.

An attractive assortment of wheat, oats, barley, rice, and canary seed was also included in this array of grain types and classes.

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## QUEENSLAND'S GREAT SUGAR INDUSTRY.

The varieties of cane exhibited by the Bureau of Sugar Experiment Stations included varieties from Hawaii, Java, India, Mauritius, and Queensland. The Queensland canes included new varieties raised from seed at the Sugar Experiment Station at South Johnstone. Up to the present about 34,500 of these seedlings have been raised, but many of them, of course, are weeded out in the process of selection. It is hoped this year to plant out 10,000 new seedlings in the field. Commercial trials of the best of them are now being undertaken, also experiments as to their disease-resisting qualities.

#### Testing Cane Varieties.

Before any cane varieties are allowed to leave the experiment stations they have to pass chemical and commercial trials through plant, first ratoon, and second ratoon crops. Each variety is tested not less than four times in the course of the sugar season, so that records are obtained giving farmers and millowners information

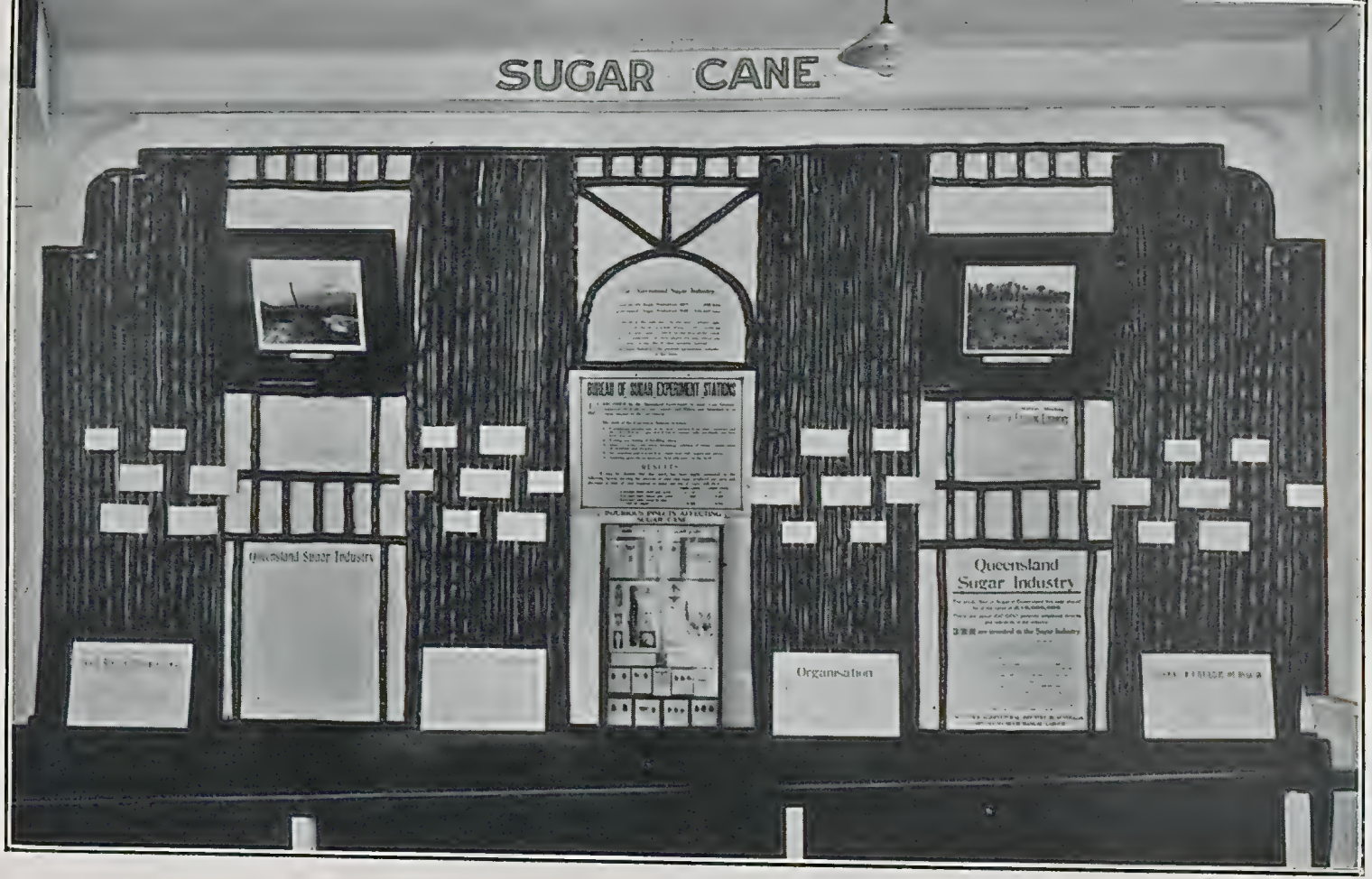


PLATE 94.—A WHITE MAN'S INDUSTRY IN A WHITE MAN'S LAND.

Cane-growing in Queensland is the only sugar industry in the world that is carried on entirely by white workers. It is the State's leading agricultural enterprise. In this bay of the Departmental Court the field and laboratory activities of the Bureau of Sugar Experiment Stations were strongly represented.

as to whether canes are early or late, and as to whether their sugar content is sufficiently high to warrant their adoption. This is combined with agricultural trials in the field, so that it may be determined whether such varieties are good croppers. They are further keenly watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance, and all canes are distributed free to growers. The worthless varieties are discarded. Information of this kind could only otherwise be secured by growers and millers at he cost of much time and money, and the rejection of many useless canes by the mills, which would be accompanied by severe loss to the growers.

Full descriptions of the varieties exhibited appeared on the cards attached to the canes, which also gave commercial cane sugar content. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period and are being distributed to canegrowers. These varieties, however, comprise a very small part of the number of new and tested canes that have been distributed from the experiment stations during the past twenty years.

### Sugar-cane Propagation.

The Sugar Experiment Station at South Johnstone, near Innisfail, has for six years been engaged in the direction of raising cane from the seed. This requires the utmost care, for the seed is very minute and has to be most carefully handled. Specially prepared boxes of soil which have previously been sterilised are used. The cane arrows, when mature, are gently broken off, spread over the soil, watered, and then covered with glass plates. When germination takes place a large number of minute shoots like grass appear. When these have made further growth they are carefully pricked out into pots or boxes, and are ultimately removed to the field.

### Soils, Cultivation, and Fertilising.

Work at the experiment stations also comprises the study of soils, cultivation, and fertilising. It is sought to introduce improved methods of cultivation, liming, fertilising, rotation of crops, and conservation of moisture, and growers are taught the principles of cultivation during their visits to the stations, and by lectures and addresses delivered in the several sugar districts; also by the issue of bulletins. This work has been highly successful. The staffs of the stations analyse soils free for canegrowers, and give advice by personal interviews or by letter on the requirements of the soil in the way of application of lime where necessary, green manuring and fertilising, and the treatment of the land by proper soil handling. About 1,800 cane soils have so far been analysed. Cane samples are also tested free of charge, so that growers may know the best time at which to cut their cane. Field officers also move around among farmers, giving advice on cultural operations.

### Investigation and Research.

Investigation and research work in connection with the most serious pest of the sugar-cane, viz.—the grub, is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins on the subject have been issued. The entomological laboratories are situated at Meringa (near Cairns), Bundaberg, and Mackay. Chemical fumigants are being successfully used in the destruction of cane grubs. A pathological staff has also been established to deal with diseases in cane, and travelling pathologists are advising cane farmers on disease questions.

### Economic Value of Cane Cultivation—Its National Significance.

The work of the Bureau of Sugar Experiment Stations, in relation to the promotion of the agricultural welfare of Queensland in connection with the sugar industry, cannot be over-estimated. When it is considered that this industry is the greatest agricultural one in Queensland, and will produce about 500,000 tons of sugar this year, estimated to be of the value of about £10,000,000, it will be appreciated how highly necessary it is that it should be assisted and encouraged in every possible way. Apart from its economic value, however, it has a deep national significance, and has already played a very large part in peopling the North.

### The Sugar Belt.

On reference to a map of Queensland it will be seen that the land in Queensland used for sugar-growing is included in a long, narrow coastal belt. Parts of this

PLATE 95.—FLEECES FROM QUEENSLAND FLOCKS.
A Study of "Counts" and Classes in the Departmental Court.
For the year ending June, 1929, the total value of Queensland's Wool Exports amounted to just under £10,000,000.

belt are separated from each other by considerable tracts of non-sugar country; these latter, owing to a deficient rainfall or poorness of soil, are not suitable for cane. This belt is between latitude 16 deg. and 28 deg. south, and most of the staple is grown within the tropics.

**Rainfall.**

The Queensland rainfall, fortunately, is highest during summer, when cane makes its greatest growth. The average rainfall in the principal sugar-growing districts is:—Cairns, 92.65; Johnstone River, 160.88; Herbert River, 84.91; Mackay, 66.67; Bundaberg, 44.40. Cane grows best when relative humidity is high, and this is naturally the case during the wet season in Northern Queensland.

Queensland's sugar production in 1867 was 338 tons, and in 1928 reached 520,000 tons, the record crop to date. The yield of cane and sugar per acre is improving, and this is due to better methods of cultivation and breeding and propagation of superior canes. The mills have also largely increased their efficiency. Over £2,000,000 have been spent during the past five years in improving existing milling plants, while, in addition, the Queensland Government has in the Tully River district the most up-to-date sugar plant in Australia.

## QUEENSLAND'S WEALTH IN WOOL.

The chief features of a very fine wool exhibit covered a range of merinos and crossbreds typical of those produced in the Coastal and Western divisions of the State. The exhibit was so arranged by the Senior Instructor in Wool, Mr. J. Carew, and his assistant, Mr. J. C. Hodge, to give instruction regarding respective qualities and types staged.

A special feature was made of scoured wool, which had been treated at the Central Technical College, in order to convey to the observer and the student the importance of this phase of the industry. Wool must be scoured in preparation for manufacture, and if this work is done in Queensland before being exported, sea freight weights would be reduced about one half. The Queensland Woollen Company, Ipswich, lent manufactured materials in order to illustrate the progress of the spinning and weaving side of the industry in this State.

In order to demonstrate the uses of sheep skins in wool, the properly flayed skin, and the treated tanned and dyed skins, were displayed. In the saving and proper treatment of skins much less can be avoided.

A small outfit for drenching and treatment of sheep against parasites was on view in an effort to drive home the necessity of keeping these on hand, in case of necessity, on the farm.

A model sheep lick container, fitted for automatic feeding, was shown in order to illustrate how the lick may be supplied without exposure to the weather, and at the same time protect the lick from contamination.

## QUEENSLAND'S RICH NATURAL PASTURES.

Queensland's natural pastures have always had a reputation for the quality of the grass and herbage plants composing them. The extent and variety of the Queensland grass flora were well illustrated by a comprehensive collection. Most of Australia's wealth comes primarily from her indigenous grasses and pasture plants. For the year ending June, 1929, the total value of Queensland's wool exports amounted to £9,801,129. This was only one item, and to it must be added the value of beef, mutton, and dairy and other products. Reading these figures one was impressed by the immense importance to Australia of good grasses, and the necessity for those engaged in pastoral pursuits to have some knowledge of that section of economic botany covering native pastures. Attention was directed to the fact that the Department is always willing to report on and name any collections of grasses, weeds, or fodder plants sent by farmers, pastoralists, and others. Among the grasses exhibited were the Blue grass, Mitchell grasses (of which four very distinct kinds are shown), Kangaroo grass, Flinders grass, native panicum grasses, love grasses, and native sorghums.

PLATE 96.—GRASS AND GRAIN PRESENTED IN COURT TO WIN A POPULAR VERDICT.

All our immense pastoral wealth is derived primarily from indigenous grasses and edible herbage. By systematic breeding the Department has evolved prolific wheats suitable to Queensland conditions of summer rainfall. This work has been an important factor in quadrupling our grain yield.

## WEEDS AND POISONOUS PLANTS.

A representative collection of weeds which have become a source of trouble to horticulturists, agriculturists, and pastoralists, throughout the State was exhibited. A large percentage of them have been introduced along with seeds of economic plants, which shows the necessity of the Pure Seeds Act now in force in the State. Some of the weeds have been introduced through other channels, such as among straw for packing, and imported fodder. Some were introduced originally as ornamental garden plants and have strayed from cultivation and now become the pests we know. The most notable case among these is the Lantana. Some of the most obnoxious have been introduced for hedge making, the worst example being the prickly-pear. The Khaki weed, another of the most obnoxious, if not perhaps the most obnoxious weed ever introduced into the State, is supposed to have come from South Africa at the time of the Boer War, being introduced to that country in fodder from the Argentine for army horses. In the collection were several plants poisonous to stock; among these were the Heart Leaf Poison Bush, Fuchsia Poison Bush, Poison Ironwood, Poison Peach, and Stramonium. The question of plants poisonous to stock is one of the most difficult problems that confronts the botanist and veterinarian alike in Australia. Each specimen in the collection was labelled with its name and information as to its properties, uses, and so forth. This panel was one of the most interesting in the Agricultural Court and attracted the attention of large numbers of stockowners.

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## COTTON.

The exhibit arranged by the Cotton Section for the Royal National Show illustrated the several factors that enter into the production of a bale of lint.

A comprehensive range of pictures gave an idea of the various stages in the development of the cotton plant from the time of thinning right through to the preparation of its products at the ginnery and the oil mill. Examples of desirable plant types were also on display. There were presented, too, some of the means which the cotton-breeder uses in determining the value of the product. These showed in detail the technical aspects of this work and demonstrated that all cotton is not necessarily good cotton.

In addition were shown examples of the grades for seed cotton used in grading the cotton as it arrives at the ginnery. Likewise, the equivalent grades for lint cotton were exhibited so that one could see the grade of lint to be obtained from each one of the seed cotton grades.

The exhibit also contained samples of the several by-products obtained from cotton seed, thus enabling one to grasp the general outlines of the operations from the selection of the planting seed right through the growth of the plant and the ginning and preparation of its products for commercial usage.

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## TOBACCO.

An attractive and instructive exhibit of bright tobacco leaf, produced in the Northern Division of the State, was well displayed in the Departmental Court. Occupying a central position, in the alcove allotted, was a stick of cured tobacco as it is taken from the flue-curing barn, showing the manner in which the leaf is strung on the stick after harvesting, for easy handling. Samples of different grades of leaf—such as lemon, orange, and bright mahogany—were shown side by side, thus supplying a useful comparison. Hands of the highest priced lemon colour, produced at Chillagoe, Mareeba, Hervey's Range, Charters Towers, and Pentland were shown to advantage.

Sample sections, to a depth of 2 ft. from the surface, of five soils, each characteristic respectively of collectively large areas in the North, were shown in glass containers. These soil types were considered to be most suitable for the production of bright tobacco and have so been proved in the course of the past two seasons.

Interspersed with these exhibits were cards detailing Commonwealth tobacco statistics, information regarding suitable soils, the culture of the crop and factors; while enlarged photographs of tobacco crops, plants in different stages of growth, flue-curing barns and other equipment, besides being informative added to the attractiveness of what was a most interesting display.

In the Commonwealth Year Book, it will be observed that in the totals of tobacco manufactured in this country during the five years instanced, less than

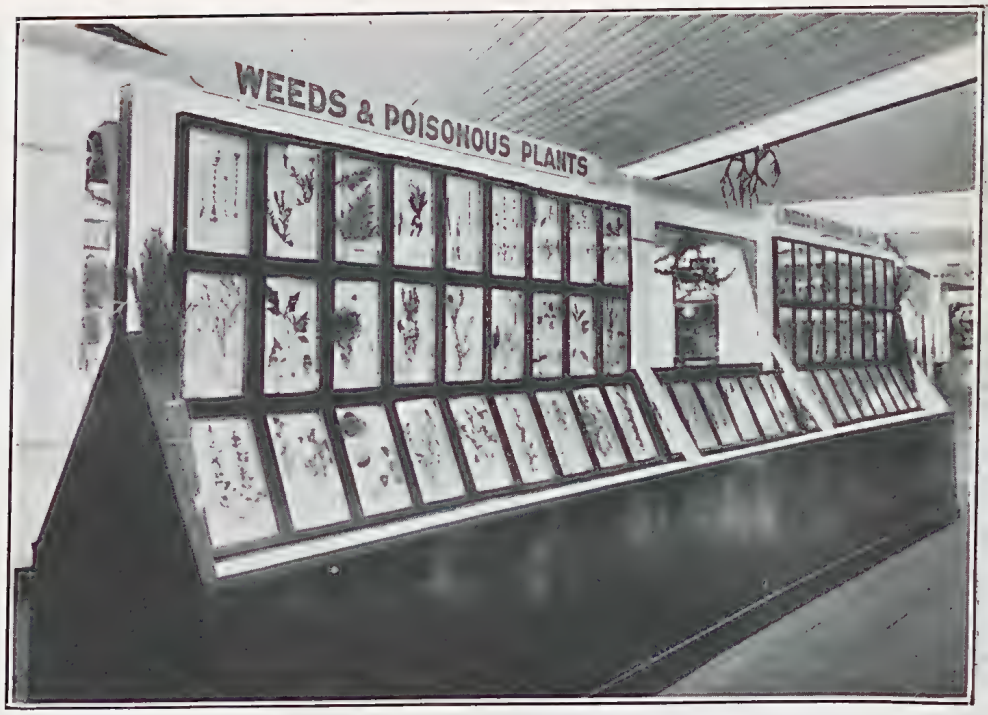


PLATE 97.—A REPRESENTATIVE COLLECTION OF WEEDS AND POISONOUS PLANTS WAS A VERY INTERESTING EXHIBIT IN THE DEPARTMENTAL COURT.

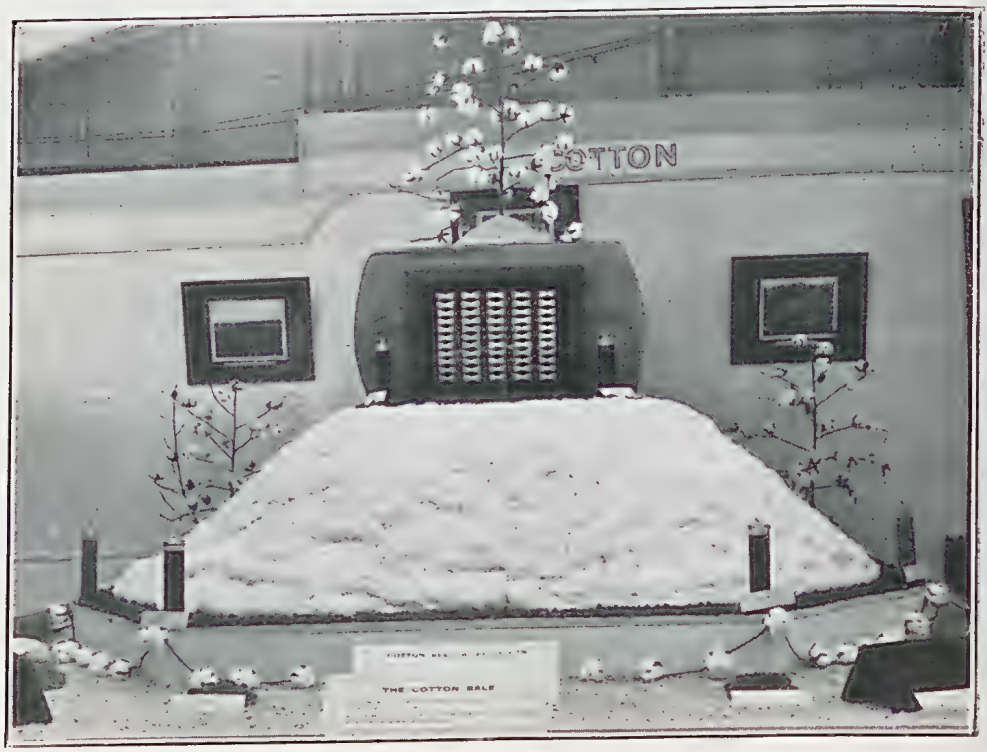


PLATE 98.—CENTRAL QUEENSLAND'S "WHITE HOPE."

This beautiful Trophy in the Court of Agriculture illustrated the fine quality of home-grown Cotton and the wide scope that exists for the further development of the industry.

8 per cent. of Australian-grown leaf was used. Since tobacco leaf has been grown in the temperate zone of Australia for upwards of fifty years, this small proportion used in manufacture denotes at least a lack of appreciation by the home smoker.

Experimental plots have been planted by the Australian Tobacco Investigation Committee in collaboration with the Department of Agriculture in several parts of tropical Queensland. The leaf from these plots on being cured, has proved to be uniformly free of objectionable aroma, while the smoking flavour is agreeable.

The encouraging and uniform results obtained in the 1927-28 season from Chillagoe in the north to Bowen in the south, and as far west as Pentland, which are included in an area of many thousands of square miles, decided the Investigation Executive to concentrate its efforts at Mareeba, where a farm was secured, the necessary buildings erected, and crops of tobacco grown during the past season. In addition small crops were grown by interested people at Chillagoe, the leaf from which was cured at the barn at Mareeba. Leaf from Pentland and the Towers was

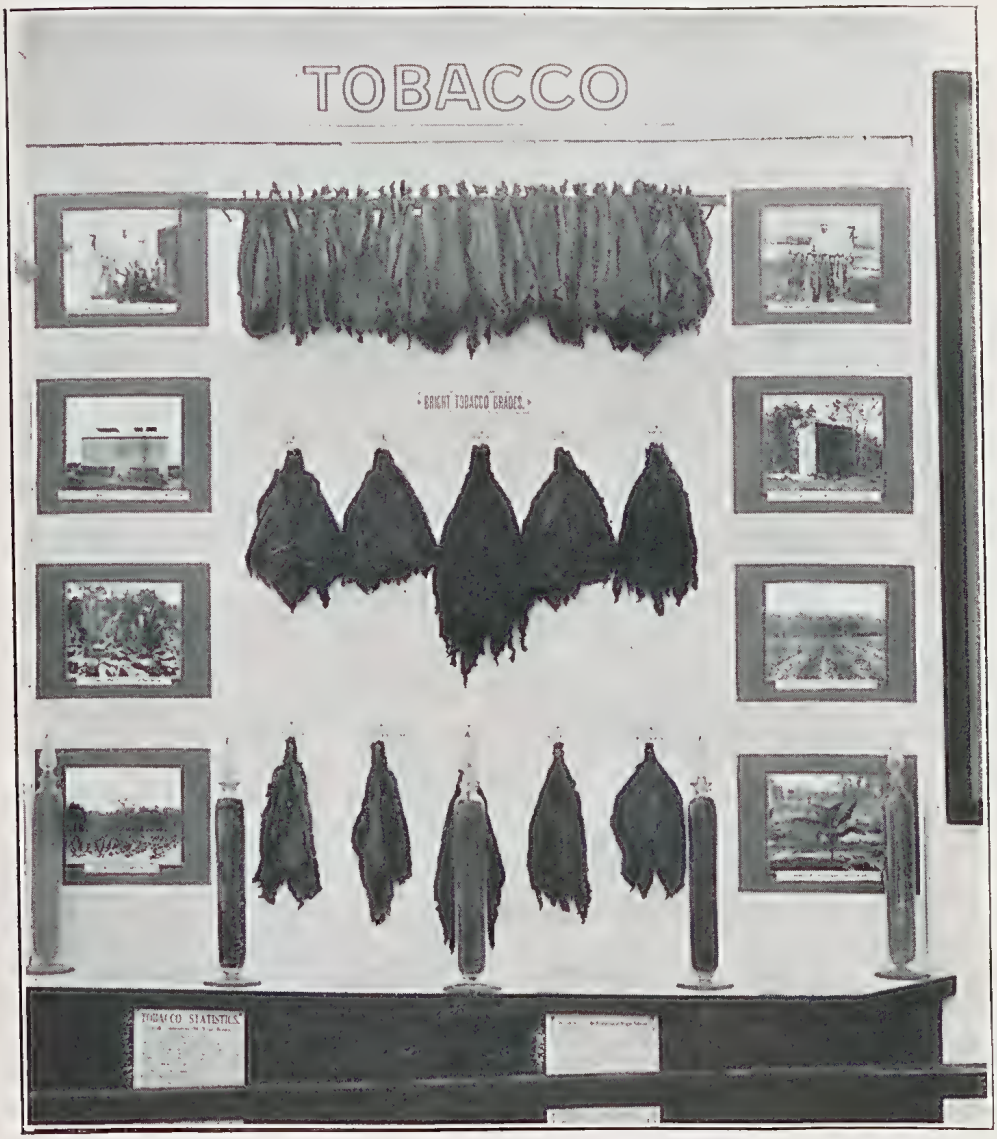


Plate 99.—Queensland-Grown Tobacco Leaf.

This panel, in the Departmental Court, attracted much attention, for it illustrated the possibilities of what may soon be a thriving Queensland industry.

cured by Departmental officers at a flue-curing barn erected at Charters Towers by the Charters Towers Tobacco Development Association, and at Hervey's Range where a crop was grown by the Townsville Tobacco Development Association. This was also cured by Departmental officers in a full-sized flue-curing barn erected by the syndicate for the purpose. The leaf from these crops, samples of which were shown in the Court, was of an excellent quality, and was stated by a competent authority to be the best yet produced in Australia.

The value of tobacco, both manufactured and untreated, imported into Australia each year, apart from customs charges, amounts to upwards of £3,000,000.

The prospects of North Queensland, should the tobacco produced there meet, as is anticipated, widespread approval, would be extremely bright.

PLATE 100.—A REPRESENTATION OF WHAT THE DAIRY INDUSTRY MEANS TO QUEENSLAND.
This great enterprise now ranks next to Sugar in aggregate annual value.

## DAIRYING.

The Dairy Exhibit was again a comprehensive and most instructive one. The principal products of milk were shown in various stages of manufacture.

The chemical constituents of a gallon of milk, a pound of butter, and a pound of cheese were exhibited in their exact quantities as separated by the analyst. Samples of by-products were shown and their value emphasised. Desiccated butter milk, for instance, was on view in its early and finished stage; this by-product is invaluable as a supplement to ordinary poultry foods, and although there is a good demand for the present output there is much room for its expansion in Queensland, which would prove of mutual benefit to the dairyman and poultry breeder alike. Casein is probably the most valuable product of skim milk, and its multiple uses were featured. Coloured graphs effectively showed at a glance the wonderful advance Queensland has made in the production of butter and cheese since 1890.

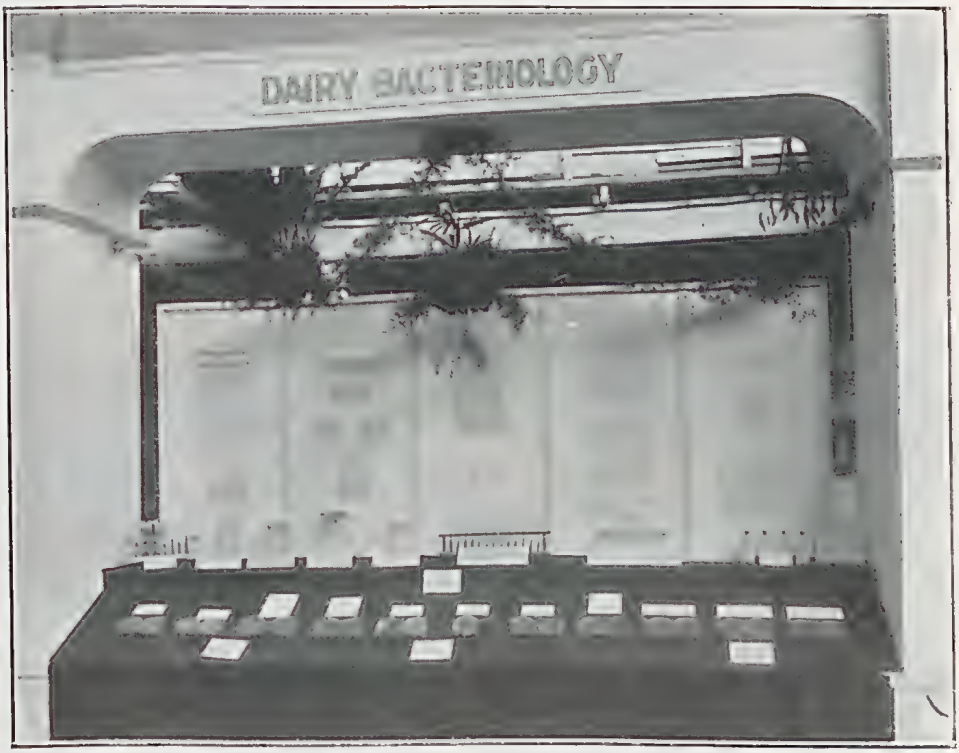


Plate 101.—Milk and Microbes.

The need for scrupulous cleanliness in the milking-shed and dairy was amply and eloquently illustrated in this alcove in the Court.

The space on the right of the Dairy Alcove was devoted mainly to matters relating to herds and herd testing. A full range of scientific instruments in general use were on view. The space on the left was devoted solely to bacteriological specimens as they affect dairy products. As the importance of bacteriological influences in relation to this industry are becoming more generally recognised, a close study of these specimens proved intensely interesting and instructive to farmers and factory operators alike. The exhibit was neatly arranged and is complete in every detail.

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## STOCK EXPERIMENT STATION EXHIBIT.

The exhibit from the Yeerongpilly Stock Experiment Station was devoted largely to the subject of milk hygiene. Cultures of bacteria isolated from milk were shown and included organisms from inside the cow's udder; the hide of the cow; the air; flies; the milker; and milk utensils.

Plate cultures were used to demonstrate that sterilised utensils do not furnish any bacteria to milk. Samples of milk showing that if certain measures of strict cleanliness are adopted, it is possible to procure them from a healthy udder and which would keep indefinitely, were exhibited. Disease-producing germs which

flourish in milk and come largely from human sources, namely typhoid and diphtheria bacilli, were displayed and were used as an object lesson on the necessity of greater care in the handling of milk. Undesirable germs, frequently present in milk, butter and cheese, some of which produce faults in flavour, texture, and colour, were also featured. Explanatory cards dealing with practical methods of prevention of mik contamination accompanied many of the specimens.

The necessity for the proper cleaning and sterilising of dairying utensils on the farm and in the factory was strikingly demonstrated by a series of plate cultures inoculated from rinsings from milk cans and other utensils.

Another section of this exhibit housed near the Meat Industry Hall illustrated the subject of Applied Bacteriology in relation to food preservation. It showed that modern methods of food preservation are processes the success of which depends on the total or partial elimination of bacterial life.

Samples of food preserved by heating, drying, smoking, salting, and otherwise, or by a combination of these processes, were exhibited. These processes were fully explained, and the effects demonstrated by plate cultivations. It was also emphasised by demonstration that all methods of food preservation largely depend on destruction or control of germ life.

The cattle tick problem and methods of control again received strong illustration, and the advantages and practicability of tick eradication were effectively brought under notice by means of official maps showing the progress of the tick eradication campaign in America. The latest return indicates that of the original 740,000 square miles of tick-infested country in 1906 in the United States, nearly 600,000 square miles have been cleared up, and the cattle released from quarantine restrictions.

Specimens illustrating the various prominent lesions of tuberculosis in animals, more especially pigs and bovines, were on view, and these were accompanied by explanatory cards indicating mode of infection and methods of prevention.

PLATE 102.—A CORNER OF THE COURT. THE VALUE OF THE DEPARTMENTAL HERD-TESTING SCHEME ILLUSTRATED.

Every farmer who hopes and works for better returns realises the necessity of increasing production by herd improvement.

## PIG RAISING.

Though the display associated with pig raising in the Court was limited in extent, it was but one of half-a-dozen pig-raising displays in different sections of the Exhibition. In the Livestock and Meat Industry Hall, for instance, three alcoves were allotted to this industry—one, an extensive array of factory products for which there is ready sale both locally and interstate; one a display featuring pork other than the cured article; and one a selection of bacon pig carcasses classed as "Ideal" by the ham and bacon curers of Queensland. At the Pig Section, an instructive display featuring different grades of bacon, ideal and otherwise, was arranged; while the trade displays staged by the several bacon-curing establishments were both extensive and pleasing to the eye.

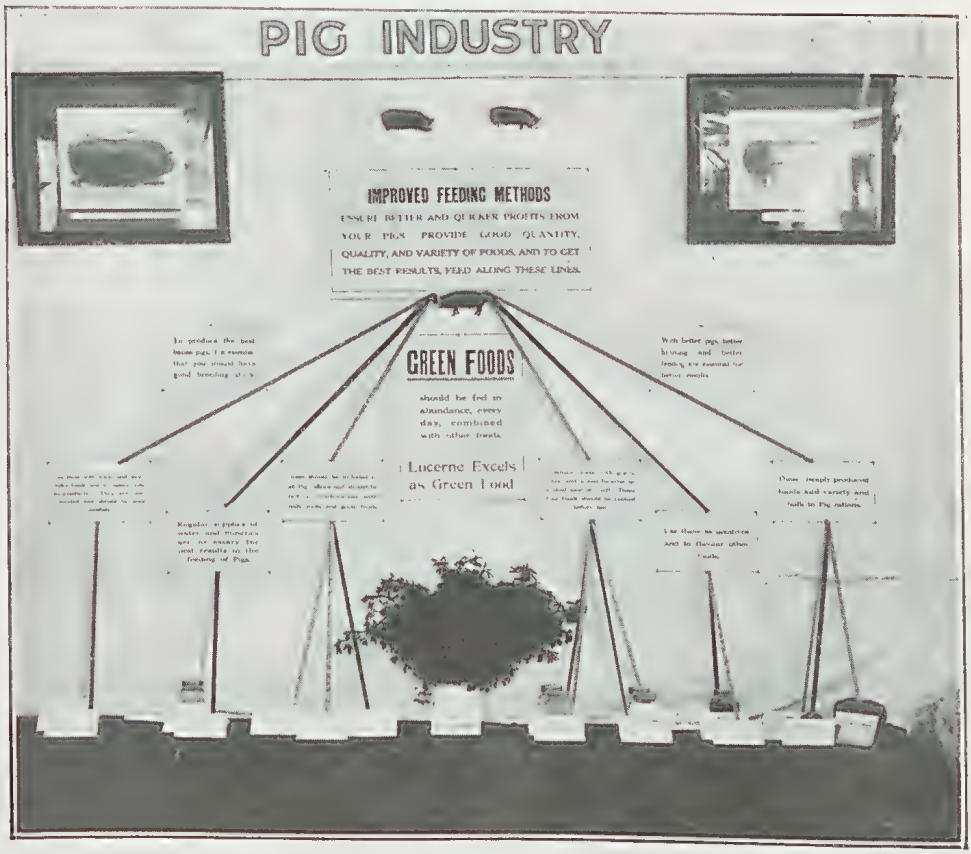
PIG INDUSTRY
IMPROVED FEEDING METHODS
ENSURE BETTER AND QUICKER PROFITS FROM YOUR PIGS PROVIDE GOOD QUANTITY, QUALITY, AND VARIETY OF FOODS, AND TO GET THE BEST RESULTS, FEED ALONG THESE LINES.
GREEN FOODS
should be fed in abundance, every day, combined with other foods
Lucerne Excels as Green Food

Plate 103.

The Sound Educational Value of Departmental Work for the Pig-farmer was well Illustrated.

In the Agricultural Court the special points emphasised were Feeds and Feeding, a most necessary and important side of the pig farming business.

From an economic point of view, pig raising in this State is complementary to several other branches of farming, and production is increasing and quality is improving.

It was demonstrated that improved feeding methods ensure better and quicker profits from pigs, and the farmer was urged to provide food in good quantity, of good quality and variety in order to secure the best results. Green foods should be fed with a liberal hand every day, and the combination of these with other more concentrated foods was stressed, as also was the necessity for regular supplies of clean drinking water and mineral matters; while it was suggested that grain should be included in all pig rations and should be fed in combination with milk, roots, and greenstuff.

Samples of the foods were exhibited. Maize was stated to be Queensland's best grain for stock and a most valuable pig food, but only so when fed in conjunction with milk products, lucerne, and other nitrogenous foods.

PLATE 104.—AN ENTENTE CORDIALE—QUEENSLAND GETS A UNANIMOUS VERDICT.

*Right:* Hon. J. W. Blair (Chief Justice of Queensland); *Centre:* Hon. Harry F. Walker (Minister for Agriculture and Stock); *Left:* Hon. W. Forgan Smith (Leader of State Opposition).

PLATE 105.—THE VICE-REGAL ESCORT. TROOP OF QUEENSLAND MOUNTED POLICE.

The Queensland Mounted Police is noted for the efficiency and all-round smartness of its expert horsemen. The horses are representative of the famous "Waler" type, so popular as cavalry chargers in Imperial and Dominion Armies. They were bred on the Government Remount Station in Central Queensland.

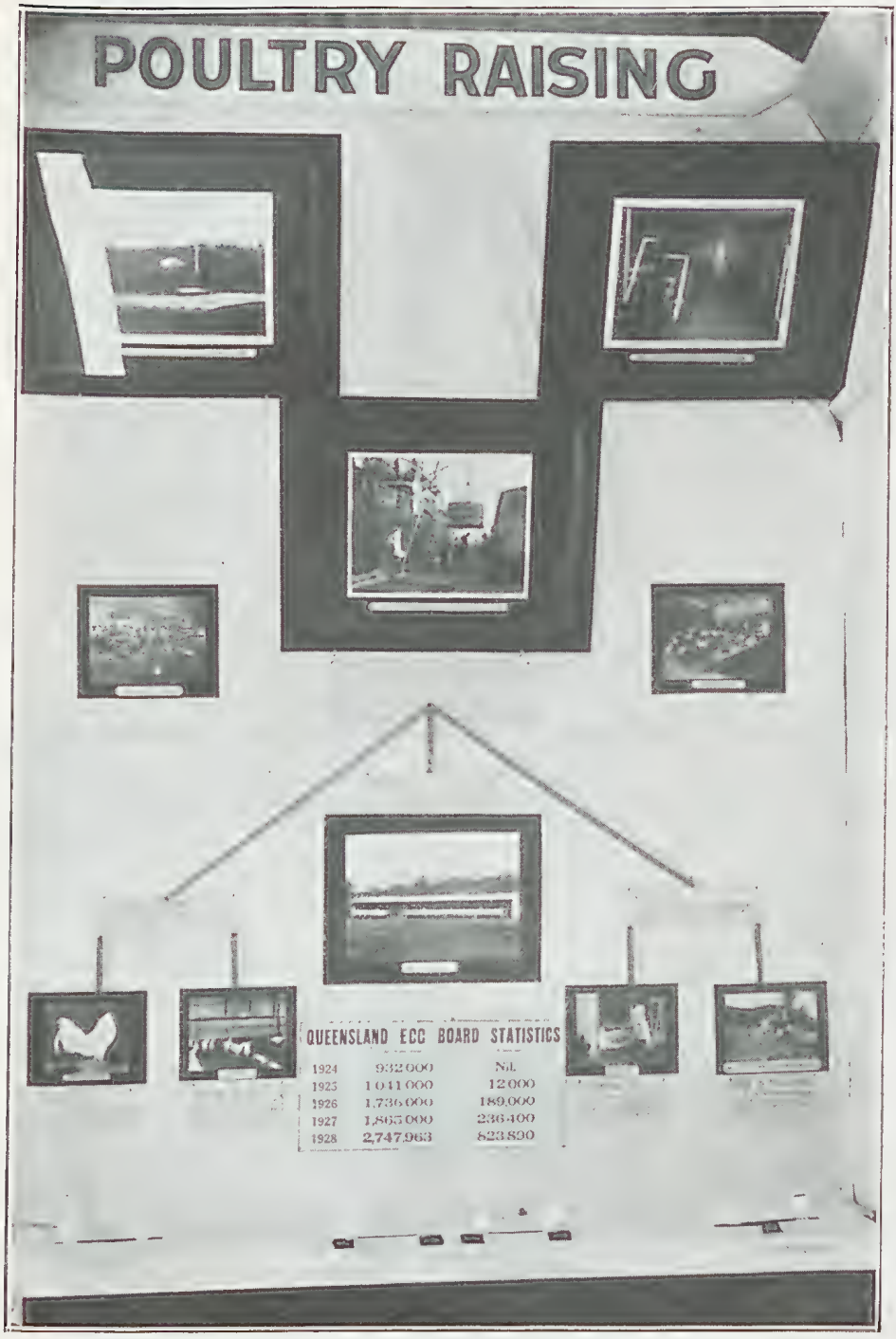


PLATE 106.—THE POULTRY PANEL IN THE COURT OF AGRICULTURE.

Poultry-raising is developing rapidly in Queensland, and has attained the status of a staple enterprise. Its annual value to the State is advancing towards £1,000,000.

## POULTRY RAISING.

Owing to the extensive development that has taken place in the poultry industry during recent years and the necessity for exporting an increasing number of eggs from year to year, it was thought desirable in planning the Poultry Exhibit to try and bring before the poultryman the necessity of producing a greater percentage of eggs fit for the world's markets.

The expansion that has taken place was indicated by a few statistics relating to the operations of the Queensland Egg Board, which has been in existence for some years. There are only two methods by which this increase may be coped with; one is by an increased consumption and another by export. To obtain either, quality of the produce is essential, and the exhibit was designed with the object of pointing out to producers factors under their control which affect the quality of the product.

Poultrymen were reminded that attention to breeding and feeding, housing, and marketing are most important factors in production. Breeding, it was pointed out, not only has a definite bearing on the number of eggs a bird will produce, but also is largely responsible for the size of the egg. For profitable export it is necessary to have other things as well as size. The yolk of an egg should have a good colour; there should be no evaporation of the natural moisture contents, and the shell should be unsoiled. Cards and photographs indicated the directions in which producers should engage their attention with the object of retaining to the greatest degree possible the natural quality of the egg.

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## ENTOMOLOGY AND PLANT PATHOLOGY.

As in previous years the Division of Entomology and Plant Pathology staged an extensive exhibit dealing with the more important pests and diseases that come within its province.

The Entomological Branch of the Division was represented by an extensive series of thirty-four exhibition cases dealing with the life histories of fruit, vegetable, grain, cotton, and stock pests. Each of these cases contained a comprehensive series of water-colour sketches of the various stages through which the insects pass in their life cycles. In most instances typical specimens of the injuries inflicted by these pests were also illustrated. The value of the display was further enhanced by a large series of plant specimens, fruit, foliage, twigs, and roots, showing the actual insect damage. The water-colour sketches were the work of Messrs. I. W. Helmsing, E. Jarvis, and H. Jarvis. The exhibition cases displayed were in most cases based on original life history studies made by officers of the Branch.

An exhibition case of outstanding interest was that dealing with the sawfly associated with cattle-poisoning fatalities in certain of the pastoral districts. Important fruit pests dealt with were the Queensland fruit fly, the spiny orange bug, the codling moth, and the San José scale. The bean fly, which has been particularly destructive this year, was fully illustrated; and the moth that so frequently injures potato tubers in its larval stage was also adequately dealt with. Grain weevils and pea and bean weevils were important insects exhibited this year. Banana pests were also dealt with in three cases containing a comprehensive range of these insects.

A special panel of cases was used to illustrate matters of general entomological interest, and included therein were two cabinets containing the stomach contents of insectivorous birds, and demonstrated very effectively the economic value of many of our native birds.

The entomological exhibit was arranged by Mr. J. A. Weddell, under the supervision of Mr. Veitch, Chief Entomologist.

The Pathological Branch was again represented by a very extensive series of preserved plant specimens illustrating the commoner diseases of many of our important economic plants. Special attention was given to the diseases of bananas, tomatoes, and citrus; and a representative series of specimens illustrating flag smut of wheat, which has been abnormally prevalent on the Darling Downs during the past season, was also featured. A series of coloured illustrations of diseases was another valuable feature of the display. This section was arranged by Mr. R. B. Morwood, acting under the supervision of Mr. J. H. Simmonds, Plant Pathologist.

PLATE 107.

These panels, in the Departmental Court, were centres of attraction for producers and students

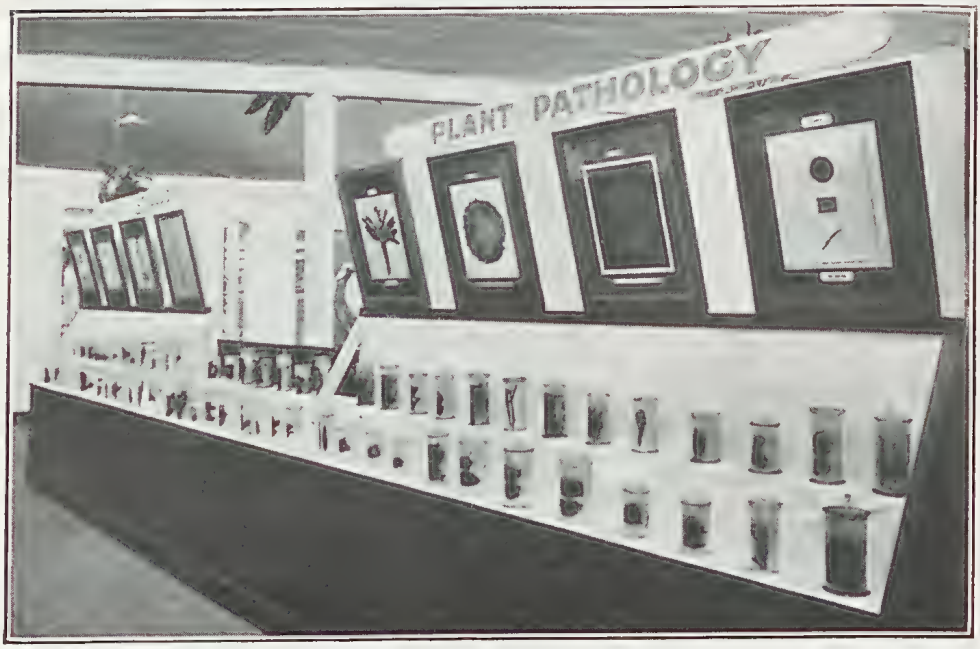


PLATE 108.—HOW QUEENSLAND FARMERS ARE SERVED BY SCIENCE.

The Valuable Work of the Entomologist and Plant Pathologist was well displayed in the Departmental Court.]

Plate 109.—The Journal Alcove was a Clearing House for Departmental Information. (Mr. Eric Keehn in attendance).

## SEEDS, STOCK FOODS, FERTILISERS, AND PEST DESTROYERS.

A small exhibit by the Seeds, Stock Foods, Fertilisers, and Pest Destroyers Branch of the Department of Agriculture directed attention to the legislation regulating the sale of these materials.

The Exhibition brought merchants and storekeepers from all parts of the State to Brisbane, and those interested in the sale of seeds for sowing, stock foods, stock licks, fertilisers, cattle and sheep dips, were advised to call at the Department of Agriculture and discuss with the Officer in Charge of the Investigation Branch some of the problems that arise in connection with these materials. All persons in any way connected with the sale or purchase of what may be called the farmer's raw materials would do well to apply for a copy of the extract from the Department's Annual Report dealing with this subject.

The impurities of frequent occurrence in stock foods and agricultural seeds were represented in the exhibit by a collection of ninety named weed seeds, from which is was possible for both merchant and farmer to identify some of these far too frequent impurities. The old saying that one year's seeding makes seven years' weeding is far nearer the truth than many think, as weed seeds do not always germinate during the first year. It is also possible to find dodder in lucerne paddocks as the result of dodder seeds carried by flood or by animals that have grazed over dodder-infested land. The one and only way to get rid of weeds that produce seeds is to prevent them from seeding; which is a matter in the hands of those who occupy the land.

PLATE 110.—THE ECONOMICS OF AGRICULTURE IN SOME IMPORTANT PHASES WERE ILLUSTRATED IN THIS INTERESTING EXHIBIT.

From a card headed "Germination Standards for Agricultural Seeds" it was learnt that with the exception of Mauritius beans, Rape, and Mangel, the agricultural seeds used in Queensland are produced in Australia. Mauritius beans used largely in the sugar districts for green manuring are frequently of poor germination. Buyers would, therefore, be well advised to ascertain the percentage of germination before sowing. In the case of canegrowers or farmers buying seeds for their own sowing no charge is made; merchants or others selling seeds are charged the nominal sum of 2s. 6d. per sample.

For the guidance of those interested, printed cards set out both the accepted common and scientific names of many weeds of frequent occurrence, also the names of the materials in which they are usually found.

From the printed matter relating to vegetable seeds it was noted that Queensland's principal supplies are obtained from overseas; and for the information of buyers the minimum germination required for each kind was given.

Under the Stock Foods Acts all meals must be labelled setting out the minimum percentage of crude protein and crude fat, also the maximum percentage of crude fibre. A card in the exhibit gave the nutritive values of meals made from whole grain as compared with wheat by-products—bran and pollard. The Stock Foods Acts now include stock licks and mineral foods. A card entitled "Bone Meal and Rock Phosphates for Feeding Purposes" set out that definite standards have

now been fixed for these materials. Roughly, all sterilised bonemeal must be of such fineness as to permit 95 per cent. by weight passing through an aperture of one twenty-fifth of an inch. Nauru phosphate must also be of such fineness as will permit of at least 95 per cent. by weight passing through an aperture one-hundredth of an inch. Buyers are warned that the ordinary bonemeal and Nauru phosphate prepared for sale as fertilisers are not suitable for feeding purposes. The amount of phosphoric acid contained in these materials must appear on the label. Pastoralists and others interested in the use of stock licks and mineral feeds are strongly advised to consult the Department and at all times refrain from the purchase of material not bearing the seller's guarantee. Particulars of the Acts' requirements were set out on a card in the exhibit.

The new system of grass land management was explained as making the most of young and short grass, which is of much better feeding value than grass that has begun to produce flowering stems. Young grass provides a ration that favours meat, milk, and growth generally, against old grass which, in some cases, barely provides for maintenance. Grass can be kept at its best by intermittent or rotational grazing and, on the coastal areas, by the application of a sufficient quantity of a suitable fertiliser which, in many cases, means sulphate of ammonia. Samples of the various kinds of sulphate of ammonia were exhibited. These included the ordinary quality manufactured by the Southern gasworks, which, unfortunately, is somewhat difficult in storage. The dry-neutral sulphate of ammonia with a nitrogen

PLATE 111.—THE PURE SEEDS, STOCK FOODS, AND FERTILISER BRANCH HAD AN EDUCATIVE DISPLAY THAT ILLUSTRATED A VALUABLE SERVICE TO THE MAN ON THE LAND.

content of not less than 20.6 per cent. is a great advance in physical condition over the ordinary ammonium sulphate, and a sample of the new English product with a minimum nitrogen content of 20.6 per cent. was shown. This was well worth looking at, as the colour and fineness of Billingham sulphate of ammonia never varies. As soon as supplies of this material are available in commercial quantities, it is anticipated that a considerable reduction will be made in the Queensland price of ammonium sulphate. As canegrowers are by far the largest users, this reduction in price will be of material help. From the foregoing it will be seen that nearly every country in the world is drawn on for some of the supplies required by agriculturists.

Fertilisers undoubtedly comprise by far the largest tonnage of prepared chemicals used on the land. They are not, however, the only ones, as both animal and plant life are subject to pests and parasites, causing untold losses to pastoralists, farmers, and others. These pests are fought and controlled by chemicals both inorganic and organic. The growing practice of supplementing feeding stuffs with mineral mixtures in most cases pays. The materials now used for these purposes are not only varied in character but great in quantity.

Until a few years ago the principal cattle dips, sheep dips, and other pest destroyers were imported from overseas. During the last two years an increasingly large quantity has been manufactured in Australia by manufacturers who have established works both in Queensland and in the Southern States for this particular purpose. Altogether this display, illustrating as it did new ideas and new methods, was most interesting to all engaged in land industries.

# THE MEAT INDUSTRY.

## AN EXCELLENT EXHIBIT.

IN officially opening the Meat Industry Hall at the Brisbane Exhibition, the Premier (Hon. A. E. Moore) said it as one of the finest exhibits that could be staged. He urged sheep and cattle growers to improve the quality of the stock so as to meet fierce international and interstate competition.

Mr. J. B. Cramsie (chairman of the Meat Industry Board of New South Wales), who recently returned from a world tour in the interests of the meat industry of Australia, said that it was the finest meat exhibit he had ever seen. He urged producers to organise, and he hoped the time would come when Australia would stand in the very forefront as the Argentine of the Pacific.

Mr. Ernest Baynes (president of the Royal Association), in welcoming the Premier, said the primary purpose of the display was to promote the interests of the live stock industry, and, although the association's activities in this direction were only two years old, he was confident that the great primary industries were awakening to the fact that the merits of their finished products would be better understood through exhibits of that nature.

PLATE 112.

The Spirit of Queensland was reflected in the Premier's smile.

### Importance of By-Products.

Mr. Baynes explained that the main portion of the exhibit dealt with live stock as a source of food supply, but as meat production and the production of many other necessities of life went hand-in-hand, prominence also was given to the importance of by-products. Take the bullock, for example: If a 1,000-lb. live-weight bullock could be used for nothing but its food value there would be approximately 440 lb. of waste, and if this were not convertible into usuable products, either the producer would receive less for his animal, or the consumer would pay more for his food.

In the by-products exhibits they welcomed the co-operation of several Southern industries, particularly as they absorbed a large percentage of the live stock and of raw by-products produced in Queensland, but they also looked forward to the expansion of similar industries in Queensland, believing that it was an economically sound principle that manufacturing should be performed as nearly as it efficiently could be to the source of its raw material, which suggested that, in course of time, less live stock and less of the raw by-products should be shipped away from this State, and that manufactured products should be substituted. In these days food products could be given a wide distribution without the slightest deterioration in quality or wholesomeness. There were several other means of bettering the status of the live stock industry. One, the branding of carcass meat as a guarantee of quality; another, the attention that might be given to the nutritive value of the cheaper cuts of meat. A little demonstration of each of these subjects was included.

Mr. Baynes added that the finished products in the exhibit were particularly interesting to housewives. Producers of live stock should bear in mind that their final purpose was to produce beef, mutton, lamb, pork, or veal of a quality that would be attractive to the consumer. The exhibit dealt with the live stock industry as one unit rather than with any particular branch of it. Its different branches had different problems, and some very real ones.

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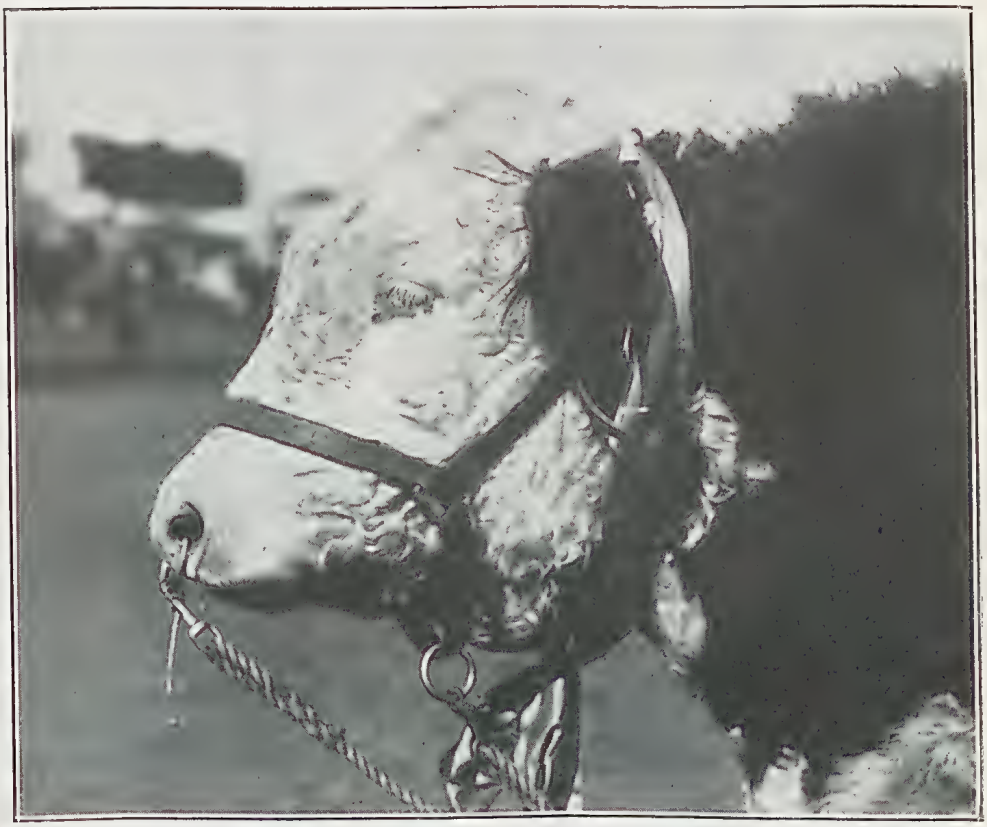

Plate 113.—A Noble Profile—Head of the Champion Hereford, Mr. S. N. Innes' Hobartville Forest King.

# DAIRY CATTLE AT THE SHOW.

## ILLAWARRAS.

THE Illawarra Milking Shorthorn breed was one of the largest on the entry list, and attracted most attention. The judge, Mr. James Young, of Raleigh, New South Wales, was particularly impressed with the aged cows and bulls, and he said the younger stock were certainly impressive.

The aged classes were particularly strong, and were in excellent condition. There was a very strong contest in the aged cows, 5 years old or over, in milk, and culling was rigidly adhered to. It was a most difficult job to make a selection. It was evident that the judge was impressed with Mr. A. T. Water's Favourite 2nd of Railway View, which annexed the blue, and at a latter period was proclaimed champion of the Illawarras. This beast was a rich red, and it may be here mentioned that the reds predominated throughout the section. The cow, 4 years old and under 5 years, in milk, was one of the prettiest classes the writer has seen for years, and speculation was high as to which would secure first honour. It was quite evident that Mr. J. Phillip's Myrtle 4th of Temor Grove caught the eye of a keen judge, and she secured the blue, with Mr. A. Pickles' Lady Kiama of Blocklands a close second. The younger classes began to come in, and great was the excellence. For cow, 3 years old and under 4 years, in milk, the first prize was captured by Mr. A. T. Waters' Fussy 5th of Railway View. The milking qualities of the aged cows was a revelation, and they were all in the pink of condition.

The more youthful females were a feature on their own, and bore striking evidence of care and well-chosen methods on the part of their breeders. The heifers, 2 years old and over 3 years, in milk, were of high class, and Ivo 2nd of Dnalwon, owned by Mr. A. J. Caswell, secured a well-merited blue ribbon with a runner-up of merit in Mr. A. Pickels' Lady Myrtle 2nd of Blacklands. For the cow, 5 years old or over, in calf or dry, competition was keen. Mr. R. A. Scott's Golden of Waverley shone out, and finally secured the first honour. For cow, 4 years old and under 5 years, with calf or dry, a spirited contest took place, and Mr. C. W. Heading's Red Rose of Headlands won. This was one of the most interesting classes of females. The heifer class, of 12 months old and under 18 months, attracted a particularly choice collection of excellent animals, with rich reds prominent, and a few beautiful roans. Mr. A. T. Waters, with his Favourite 8th of Railway, was again successful in annexing the first prize, with Mr. G. W. Reading's Irene 2nd of Headlands a well-earned second. There was a very fine exhibit of heifer calves, 6 months old aund under 12 months, and a little picture, named Mona 5th of Oakvale, owned by Mr. B. O'Connor, scored. The children's half class attracted considerable attention, and Miss F. Hickey had no trouble in scoring a first for a pretty little pearl called Primrose of Glendalough.

The showing of groups gave the general public an insight into the class composed of male and females, with their offspring, and probably no class was better suited for exhibition purposes. They were valuable, as well as beautiful to look at. The group of three cows, 3 years old or over, in milk, or dry, provided a rich class, and Mr. A. T. Waters came first, with Mr. A. Pickels second, and Mr. B. O'Connor third. The group of three heifers, under 3 years old, in milk, or dry, bred and owned by the exhibitor, caused a weighty and anxious time. The judge gave Mr. A. Pickels first, B. O'Connor second, and S. Henry third.

Probably no other show in the Commonwealth to-day possesses the splendid type of bulls that was seen here. Every beast posessed quality, and was in the pink of condition, but a few animals on the scraggy side should never have left the farm. There was a very keen contest when the bulls, 4 years old or over, were brought before the judge. The class was one of the largest of the day, and reds again predominated. Culling, it was noticed, was inevitable, and the bulls sent out looked as though they had no right to be there, for they certainly chewed their cuds. "Wonderful," was the comment of the judge regarding those which were left, and indeed they were more than wonderful, for they bore the stamp of quality, combined with stamina. All eyes were on Lord Kitchener of Werona, owned and bred by Mr. J. W. Johnston. This beast bore the aristocratic element of the great war general, being a massive, well-built animal, with a wonderful constitution. He not only secured the blue, but carried the championship of all the Illawarras at the show. Another well-ribbed sire, owned by J. H. Weber, Radiant of Greyleigh, a rich red, came a good second. For the bull, 3 years old and under 4 years, Mr. Charles Francis, with his Limelight of Culvallis, secured first; and a young and well-proportioned bull, owned by Mr. J. Phillip, called Jellicoe of Headland, of 2 years old and under 3 years, also annexed first place.

PLATE 114.

Milton's Tribesman 3rd, by Masterkey (imp.); dam, Milton's Elaine; Champion Beef Shorthorn Bull, Royal National Show, 1929. Bred by Mr. Anthony Hordern at his Milton Park Stud, Bowral, New South Wales, and exhibited by the Gindie State Farm (Mr. E. R. Ashburn, Manager).

One of the prettiest of the younger bulls on the ground was Mr. J. A. Montgomery's Renown of Mountain Home, in the class for 12 months old and under 18 months, and he won easily. It would not be surprising to find this splendid animal coming rapidly to the front in the coming years. The groups of the Illawarras were a special feature, and the sire and his progeny were a particularly handsome lot. Mr. James Farquharson came first; and in the breeders' group Mr. A. Pickels' exhibit showed up well. The sire's progeny stakes group had a hearty reception. Mr. B. O'Connor came first, and in the exhibitors' group Mr. A. Pickels was again successful.

## THE JERSEYS.

Jerseys were well representative of the wonderful strides the breed has made in Queensland. The attendance was most marked during the judging period, and the awards were watched with keen interest. The judge was Mr. R. R. Kerr, of Yan Yean, Victoria, a very keen and observant man, and the general opinion was that his decisions were on the whole satisfactory. A general improvement in the preparation was noticeable. Mr. Kerr was particularly well pleased with the Jersey bulls, and, as he remarked, "this is the animal we are all looking for." There were quite a number of cattle in the ring of outstanding merit, but, on the other hand, remarked the judge, there were a few animals that should never have been led into a show ring. The Brisbane show of Jerseys promises to be one of the best in Australia, and it is well for breeders to adhere to that type of cattle which will command respect and add to the wealth of the farm.

The aged cows of 5 years old or over, in milk, were a particularly choice lot, and the judging was carried out with marked ability. It was evident that Messrs. E. Burton and Sons (Wanora), with their Oxford Golden Butter Cup, attracted the attention of the judge, for she secured not only the coveted blue, but was crowned champion Jersey cow for the day, with Mr. Joseph Sinnamon's Oxford Hazel second, and also reserve champion. There was a keen contest in the class of cow of 4 years old and under 5 years, in milk, and Mr. Joseph Sinnamon scored the coveted blue ribbon with his Trinity Gentle Lady. For cow, 3 years old and under 4 years, in milk, E. Burton and Sons, of Wanora, with their beautiful Oxford Ginger, came a good first. In the younger class of heifer, 2 years old and under 3 years, in milk, there was a fairly keen contest, and the result favoured Mr. Joseph Sinnamon, with his Trinity Columbine for first place, with W. Spresser and Son's Carnation Daisy a good second. For the heifer, 2 years old and under 3 years, in calf, the blue ribbon went to a smart little animal owned by E. P. Fowler and Son, in their Carlyle Larkspur. In the heifer, 18 months old and under 2 years, dry, Mr. T. A. Petherick won first place with his Trecarne Locket. For the heifer, 12 months old and under 18 months, dry, E. Burton and Sons again were first with their Oxford Gloria. The groups of Jerseys were particularly pleasing, and formed one of the best staged exhibits at the show. The groups of three heifers, under 3 years old, in milk, or dry, were a feature, and W. Spresser and Son came first, E. Burton and Sons (Wanora) second, and Joseph Sinnamon third. The bull, 3 years old and under 4 years, was won by Messrs. W. E. O. Meier's Cyclone of Woodstock, with a smart runner up in Mr. T. A. Petherick's Trecarne Sultan. For the aged bulls a very keen contest was waged, and Mr. W. W. Mallet's Trinity Darby secured first honour, and finally secured the championship of all the Jerseys. For the reesrve champion, Mr. T. A. Trecarne's Golden King was selected.

The younger classes came in for a severe test, and for bull calf, 12 months old and under 18 months, the first prize went to Mr. B. J. Jensen's Kelvinside Noble's Chieftain. As in other dairy breeds, the groups attracted attention, and for the sire and his progeny the positions were: E. Burton and Sons first, W. Spresser and Son second, and W. W. Mallet third. The breeders' group proved an interesting event, and was one of the most attractive in the ring. The placings were as follow:—E. Burton and Sons first, Joseph Sinnamon second, and W. Spresser and Son third. The positions were the same in the exhibitors' group. The sires' progeny stakes were a feature of the section. E. Burton and Sons secured first with progeny of Oxford Golden Noble, Joseph Sinnamon second, and E. Burton and Sons third with the progeny of Oxford Renown.

## THE AYRSHIRES.

Next to the Illawarras as a utility class of dairy breed, the Ayrshires have a place, and it is something to be proud of for Queensland to have such a magnificent class of dairy stock to draw upon. Each year their grace and their spotted beauty add to the attractiveness of the show. All day long there was an interested and what may be termed an anxious expression on the faces of well-known breeders. The judge was Mr. John Buchanan, of Flinders, Victoria, a well-known Ayrshire man, quiet in demeanour, and with no frills. He went through his task in a manner most commendable. "They are a great lot," said Mr. Buchanan, "with a style hard to beat. The young stock were very good, although a tail was observable."

PLATE 115.

Actress 3rd of Milton, by Doono Monarch (imp.); dam Milton's Actress 2nd, Champion Beef Shorthorn female, Royal National Show, 1929. Bred by Mr. Anthony Hordern at his Milton Park Stud, Bowral, New South Wales, and exhibited by Gindie State Farm (Mr. E. R. Ashburn, Manager).

The females of the Ayrshires shone out in splendour, and their well-groomed coats and pretty spots were a relief. The contests as the day wore on were marked by a degree of keenness. The aged cow class, 5 years old or over, in milk, was a veritable picture. Mr. J. C. Mann's Beryl's Pride of Crescent Farm, was awarded first place, and also secured a well-merited championship. For the cow, 4 years old and under 5 years, in milk, Thomas Holmes' Longlands Tulip gained first place, with the same breeder's Longlands Isabel second. For the younger set of cows of 3 years old and under 4 years, in milk, Stimpson's Limited won easily with a very classy beast known as Benbecula Bellona. In the younger classes of females the stock shone out, and were in clean and well-kept condition. In the class heifers, 2 years old and under 3 years, Mr. Thomas Holmes won first place with his pretty little Longlands Marguerite. In the heifers, 18 months old and under 2 years, the first award went to Stimpsons Limited with a neat little animal known as Eleresley Mabel. The groups were very attractive, and gave the impression that the breed was being well looked after, and, as prominent Ayrshire breeders expressed it, they were a marvel of quality and beauty. The group of three heifers was particularly attractive, and the positions were as follow:—Thomas Holmes first, J. H. and R. M. Anderson second, and Stimpsons Limited third.

The aged bulls were a special feature of the show. For the bull, 4 years old or over, Stimpsons Limited came first with their Longlands Titus, and it will be remembered that this bull won the championship at the 1928 show. It was in the younger class of bulls that the keenest interest was manifested. For the bull, 3 years and under 4 years, Thomas Holmes' Claredale Bonnie Billy not only secured first place, but obtained the championship. The younger bulls were a fine lot, although a "tail" was noticeable in some classes. The competition for the bull, 2 years old and under 3 years, was interesting, and J. T. Knowles' Titus secured a first. In the class for bulls, 1 year old and under 2 years, Stimpsons Limited scored wth Eleresley Grand. The sire and his progeny stakes group was an excellent example of breeding, and Stimpsons Limited were successful with their Longlands Titus. The breeders' group was highly interesting, and once again Stimpsons Limited secured the honours.

## THE FRIESIANS.

The Friesian classes created more interest this year than hitherto. The American records for milk probably added to the prestige, and it would not be surprising to see them becoming one of the most popular breeds of the State. They are big, upstanding cattle, with massive formation and great flank depth. They also possess plenty of bone, and when in prime condition would weigh well. The judge, Mr. V. J. Lamond, of Nowra, New South Wales, was one of the youngest judges yet seen on the Brisbane Show Ground, but his method of classification and his diligent research for quality were outstanding. The class was not one of the largest, and the judge soon got through with his work. He expressed pleasure at the quality presented, and he liked the dry cows. The aged cows were of a fine type, and Hickey and Son's College Princess Pontiac secured first position, and was also awarded championship. In the cow, 3 years old and under 4 years, in milk, Hickey and Son again scored a win. For the heifer, 2 years old and under 3 years, in milk, Mr. G. Newman's St. Athan Gypsy came first. For the younger set of females Hickey and Son scored again with their Stoneybrae Duchess. For cow, 3 years old and under 4 years, in calf, Mr. W. Richter's Oakland Hollyhock scored a first. The younger females were an attractive lot, although lacking in condition. In the heifer, 12 months old and under 18 months, the first prize went to C. Behrendorff's Inavale Maud.

The bulls were massive in construction, and looked well. The class for bull, 4 years old and over, was won by Messrs. D. Young and Son's Colossus of Stathan. It was in a younger class, however, that a champion was discovered, Mr. W. H. Grams' St. Athan Actuary carrying the championship. The groups were well contested, and the sires' progeny stakes group was won by Hickey and Sons with the progeny of Burnbrae Dumark Echo.

## THE GUERNSEYS.

The yellow class of dairy stock Guernseys was the smallest section among the dairy breeds, but there appeared to be more interest shown this year than formerly. The judge was Dr. R. M. Kinross, of Ryde, New South Wales, who exercised great care in his determination. He said he was very pleased with the class presented, and stated that the class generally was true to type. The young females, he said, showed great promise.

Cows.—Four years or over, in milk: A. Cooke's Inglewood Butter Girl 1, A. Cooke's Minnamurra Eclipse 2, A. E. Gillespie's Caramana Polly 3. Three and under 4 years: A. Cooke's Inglewood Primrose 1, A. C. K. Cooke's Lynwood Beauty 2. Four years or over, in calf or dry: A. Cooke's Minnamurra Cherubine 1, A. E. Gillespie's Caramana Dolly 2, A. C. K. Cooke's Minnamurra 3. Three and under 4

years: A. E. Gillespie's Caramana Golden Lustre 2nd. Champion (cow or heifer): A. Cooke's Minnamurra Cherubine. Reserve champion: A. Cooke's Inglewood Primrose. Heifers: Two and under 3 years, in milk: A. Cooke's Belmont Bells. One and under 2 years: A. C. K. Cooke's Moongi Prairie Flower 1, A. Cooke's Lynwood Bracelet 2, A. J. Cranney's Lynwood Mignonette 3. Two years and under 3, dry: A. Cooke's Lynwood Generous 1, A. C. K. Cooke's Laureldale Fussy 2, A. C. K. Cooke's Laureldale Lucky 3. One and under 2 years: A. J. Cranney's Belmont Jasmine 1, A. C. K. Cooke's Moongi Sylph's Showgirl 2, A. E. Gillespie's Tanto Golden Lustre 3. Six and under 12 months: A. E. Gillespie's Tanto Pretty Polly 1, A. E. Gillespie's Tanto Dolly 2, A. C. K. Cooke's Laureldale Pixie 3.

Bulls.—Three years or over: A. E. Gillespie's Victor of Wollongbar 1, R. Mackie's Gatton Lochinvar 2, A. Cooke's Lynwood Royal 3. Two and under 3 years: A. E. Gillespie's Monarch 1, A. C. K. Cooke's Lynwood Flavour 2, A. Cooke's Caraman Barrister 3. Six and under 12 months: A. J. Cranney's Lynwood Royal's Laddie 1, A. E. Gillespie's Tanto Golden Langwater 2, A. Cooke's Lynwood Bounty 3. Sire and his progeny: A. Gillespie 1, A. Cooke 2. Exhibitor's group: A. Cooke 1, A. C. Cooke and A. E. Gillespie 2. One bull and two heifers: A. C. Cooke 1, A. Cooke 2, A. E. Gillespie 3. Champion of Queensland: A. E. Gillespie's Wollongbar Monarch. Reserve: R. Mackie's Gatton Lochinvar.

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## QUEENSLAND AGRICULTURAL COLLEGE.

### WORK OF STUDENT FARMERS.

In the midst of the great display of the agricultural resources of the State at the Royal National Show was the exhibit of the Queensland Agricultural High School and College, which takes such an important part in their development. As usual it was highly instructive, and contained several new features, showing the work being done at Gatton, not only to teach scientific farming but in experiments of much value to agriculture.

This year the central feature dealt with poultry, an industry which returned £598,467 to Queensland in 1928. A brooder house, in which one hen can mother 150 chicks with the aid of a simple brooder made from two kerosene tins and four maize sacks, was shown. In a display of incubators the importance of heredity in the production of good producers was emphasised. As in the cattle industry, testing is of considerable value in poultry, and in single testing pens hens similar in conformation and appearance were shown with the great difference in annual egg production. In a model of a hygienic poultry house the whole structure is bolted so that it can be taken to pieces and cleaned in case of infestation by mites or ticks. The floor is made of concrete to facilitate cleaning and sanitation, and the perches are pivotted and grooved to aid in the destruction of ticks. Simple nests made of kerosene tins are easily accessible from the front of the house.

A cotton section was exhibited in conjunction with the Department of Agriculture and Stock. A pure strain of Acala cotton is being developed, and it already appears to be the most promising competitor of Durango cotton.

The horticultural section featured dehydration, with the assistance of a model of the stack type of dehydrator and forced draught recirculating dehydrator. The value of preserved fruit and vegetables imported into Australia annually is £436,000, and dehydration, it is pointed out, can help to keep much of this money in here and conserve surplus products. Banana flour manufacture is mentioned as an industry which should be practicable in Queensland to assist in stabilising the market for the fruit.

An illustration of the maize variety trial conducted by the college in 1929 showed experiments based on the system of randomised blocks arranged on a Latin square. It gives experimental results which overcome difficulties due to soil variation.

Experiments to determine whether top-dressing of pastures to increase the carrying capacity and correct mineral deficiency diseases in stock is advisable were illustrated.

In the dairy section attention was directed to the production of clean milk, and modern types of buckets, cans, filters, and other utensils and appliances were shown. As was the case last year, the desirability of fodder conservation for drought periods was stressed. A display of farm implements used by students at the college and a collection of photographs showing various activities there were on view, and the whole display was a very effective object lesson in the value of scientific farming and animal husbandry.

# THE AWARDS.

## "A" GRADE DISTRICT EXHIBITS—A KEEN CONTEST.

AFTER endeavouring to wrest the honours from competing districts in the "A" grade exhibits for the past eight years, Wide Bay and Burnett came into its own by triumphing over the North Coast and Tablelands of New South Wales. The margin was not great, only 12½ points separating these districts. The South Coast of Queensland was third.

An analysis of the points awarded to the respective districts reveals that the judging was evidently conducted on a conservative basis compared with previous years. For instance, Wide Bay and Burnett secured 170½ points for dairy produce last year, whereas the award on this occasion was only 145, despite the fact that its organisers were under the impression that they had made an improvement in this class. North Coast and Tablelands suffered a corresponding reduction, falling back from 189½ points to 149. In foods this district also showed a decided decline in points compared with last year, its 148 on that occasion dwindling to 127. Wide Bay held its own under this section, a result which applied to both districts in regard to fruits and vegetables. Wide Bay added 10 points for grains, while its rival slightly lost ground. Again in manufactures and trades the winning district made substantial headway, and both appreciably advanced in points for minerals and building materials. In other sections the figures fluctuated in some small degree, but, whereas North Coast lost ground for effective arrangement, Wide Bay progressed, and in the aggregate points reached 1,239 compared with 1,232 last year against North Coast's 1,226½ compared with 1,269 in 1928. The South Coast of Queensland made a brave showing and slightly improved its figures of last year by gaining 1,141½ points against 1,129. The win carries with it the coveted Chelmsford Shield, and the organiser of Wide Bay and Burnett (Mr. H. Bashford) and his co-workers were heartily congratulated upon their success. Details:—

| | Possible Points. | North Coast and Tablelands of N.S.W. | Wide Bay and Burnett District | South Coast of Queensland. |
|---|---|---|---|---|
| DAIRY PRODUCE— | | | | |
| Butter | 90 | 83 | 80 | 83½ |
| Milk and by-products | 40 | 20 | 5 | 10 |
| Cheese | 60 | 30 | 45 | 40 |
| Eggs | 20 | 16 | 15 | 12 |
| Totals | 210 | 149 | 145 | 145½ |
| FOODS— | | | | |
| Hams and bacon | 50 | 35 | 45 | 43 |
| Rolled and smoked beef and mutton | 20 | 12 | 18 | 18 |
| Small goods and sausages | 10 | 6 | 9 | 10 |
| Fish, smoked, preserved, or canned | 10 | 7 | 8 | 5 |
| Canned meats | 25 | 18 | 23 | 20 |
| Lard, tallow, and animal oils | 20 | 10 | 18 | 18 |
| All butchers' by-products | 10 | 6 | 8 | 9 |
| Honey and by-products | 20 | 19 | 18 | 15 |
| Confectionery | 10 | 8 | 6 | 6 |
| Bread, biscuits, scones, and cakes | 10 | 6 | 5 | 7 |
| Totals | 185 | 127 | 158 | 151 |
| FRUITS, VEGETABLES, AND ROOTS—FRESH AND PRESERVED— | | | | |
| Fresh fruit | 60 | 50 | 54 | 54 |
| Preserved fruits, jams, and jellies | 30 | 28 | 26 | 30 |
| Crystallised and dried fruits | 20 | 17 | 15 | 18 |
| Preserved and dried vegetables | 10 | 9 | 8 | 9 |
| Fresh vegetables | 20 | 18 | 14 | 18 |
| Table pumpkins | 6 | 6 | 4 | 5 |
| Potatoes, English and sweet | 40 | 29 | 30 | 32 |
| Roots (including meals) | 14 | 6 | 12 | 12 |
| Cocoanuts, peanuts, &c. | 10 | 7 | 7 | 3 |
| Totals | 210 | 170 | 170 | 181 |

DISTRICT EXHIBITS ("A" Grade)—*continued.*

| — | Possible points. | North Coast and Tablelands of N.S.W. | Wide Bay and Burnett District | South Coast of Queensland. |
|---|---|---|---|---|
| **Grain, &c.—** | | | | |
| Wheat | 50 | 44 | 30 | 22 |
| Flour, bran, pollard, macaroni, and meals | 10 | 5 | 8 | 5 |
| Maize | 50 | 44 | 37 | 32 |
| Maizena, meals, starch, glucose, and corn-flour | 10 | 2 | 7 | 4 |
| Oats, rye, rice, barley, malt, pearl barley, and their meals | 30 | 22 | 18 | 14 |
| Totals | 150 | 117 | 100 | 77 |
| **Manufactures and Trades—** | | | | |
| All woodwork | 30 | 25 | 30 | 30 |
| All metal and ironwork | 30 | 25 | 30 | 30 |
| Leather and all leather work and tanning | 20 | 18 | 19 | 19 |
| Manufactured woollen and cotton fibre | 30 | 27 | 24 | 25 |
| Sheet metal work | 10 | 8 | 10 | 8 |
| Artificial manures | 10 | 4 | 8 | 7 |
| Brooms and brushes | 10 | 6 | 5 | 8 |
| Manufactures not otherwise enumerated | 15 | 12 | 13 | 15 |
| Totals | 155 | 125 | 139 | 142 |
| **Minerals and Building Materials—** | | | | |
| Gold, silver, copper, and precious stones | 25 | 22 | 20 | .. |
| Coal, iron, other minerals, and salt | 30 | 20 | 26 | 12 |
| Stone, bricks, cement, marble, terra cotta | 20 | 18 | 20 | 20 |
| Woods, dressed, undressed, and polished | 25 | 20 | 25 | 20 |
| Totals | 100 | 80 | 91 | 52 |
| **Tropical Products—** | | | | |
| Sugar cane | 60 | 57 | 50 | 57 |
| Sugar, raw and refined | 20 | 13 | 18 | 9 |
| Rum, other spirits, and by-products | 10 | .. | 8 | 8 |
| Coffee, raw and manufactured, tea and spices | 10 | 6 | 9 | 7 |
| Cotton (raw) and by-products | 30 | 23 | 28 | 25 |
| Rubber | 10 | .. | 8 | .. |
| Oils (vegetable) | 10 | 8 | 7 | 6 |
| Totals | 150 | 107 | 128 | 112 |
| **Wines, &c.—** | | | | |
| Wines | 15 | 12 | 3 | 4 |
| Aerated and mineral spa water, vinegar, and cordials | 10 | 7½ | 7 | 7 |
| Ales and stout | 10 | .. | 7 | .. |
| Totals | 35 | 19½ | 17 | 11 |

DISTRICT EXHIBITS ("A" GRADE)—*continued.*

| — | Possible Points. | North Coast and Tablelands of N.S.W. | Wide Bay and Burnett District | South Coast of Queensland. |
|---|---|---|---|---|
| TOBACCO— | | | | |
| Tobacco (cigar and pipe) in leaf .. .. | 20 | 14 | 15 | 16 |
| HAY, CHAFF, &C.— | | | | |
| Hay—Oaten, wheaten, lucerne, &c. .. | 30 | 28 | 18 | 20 |
| Hay in sheaf .. .. .. .. .. | 5 | 2 | 3 | 4 |
| Grasses and their seeds .. .. .. | 10 | 9 | 6 | 8 |
| Chaff—Oaten, wheaten, lucerne, &c. .. | 50 | 44 | 32 | 40 |
| Ensilage and cattle fodder .. .. .. | 20 | 14 | 15 | 9 |
| Sorghums and millets .. .. .. | 10 | 8 | 7 | 6 |
| Commercial fibres .. .. .. .. | 15 | 12 | 12 | 12 |
| Pumpkins and green fodder .. .. | 12 | 9 | 7 | 10 |
| Broom millet .. .. .. .. .. | 10 | 7 | 8 | 7 |
| Farm seeds .. .. .. .. .. | 13 | 8 | 10 | 9 |
| Totals .. .. .. .. | 175 | 141 | 118 | 125 |
| WOOL, &C.— | | | | |
| Scoured wool .. .. .. .. .. | 40 | 40 | 33 | 30 |
| Greasy wool .. .. .. .. .. | 60 | 60 | 45 | 30 |
| Mohair .. .. .. .. .. | 10 | 8 | 10 | 5 |
| Totals .. .. .. .. | 110 | 108 | 88 | 65 |
| ENLARGED PHOTOGRAPHS .. .. .. | 5 | 5 | 3 | 1 |
| EFFECTIVE ARRANGEMENT— | | | | |
| Comprehensiveness of view .. .. .. | 20 | 14 | 19 | 16 |
| Arrangement of sectional stands .. .. | 25 | 19 | 20 | 21 |
| Effective ticketing .. .. .. .. | 10 | 8 | 7 | 8 |
| General finish .. .. .. .. .. | 25 | 23 | 21 | 18 |
| Totals .. .. .. .. | 80 | 64 | 67 | 63 |
| Grand Totals .. .. .. | 1,585 | 1,226½ | 1,239 | 1,141½ |

SUMMARY OF POINTS.

| | | | | |
|---|---|---|---|---|
| Dairy produce .. .. .. .. .. | 210 | 149 | 145 | 145 |
| Foods .. .. .. .. .. .. | 185 | 127 | 158 | 151 |
| Fruits, culinary vegetables, roots .. .. | 210 | 170 | 170 | 181 |
| Cereals and by-products .. .. .. .. | 150 | 117 | 100 | 77 |
| Manufactures and trades .. .. .. .. | 155 | 125 | 139 | 142 |
| Minerals and building materials .. .. | 100 | 80 | 91 | 52 |
| Tropical products .. .. .. .. | 150 | 107 | 128 | 112 |
| Wines, &c. .. .. .. .. .. | 35 | 19½ | 17 | 11 |
| Tobacco .. .. .. .. .. | 20 | 14 | 15 | 16 |
| Hay, chaff, fodder, &c. .. .. .. .. | 175 | 141 | 118 | 125 |
| Wool, &c. .. .. .. .. .. | 110 | 108 | 88 | 65 |
| Enlarged photographs .. .. .. .. | 5 | 5 | 3 | 1 |
| Effective arrangement .. .. .. .. | 80 | 64 | 67 | 63 |
| Totals .. .. .. .. | 1,585 | 1,226½ | 1,239 | 1,141½ |

## "B" GRADE DISTRICT CONTEST.

The points awarded in the "B" grade district competition left no doubt as to the superiority of the Brisbane Valley, its keenest rival being Northern Darling Downs, which was 171½ points behind. Then followed Nanango, Kingaroy, Mount Larcom, and Oakey in the order named. Brisbane Valley's win is its fourth in succession, and the wide and varied nature of its resources has prompted the suggestion that it should be transferred to the "A" grade. A notable advance was made by Nanango, which moved up from fifth place last year to third position on this occasion. Details:—

| | Possible Points. | Oakey. | Brisbane Valley. | Nanango. | Northern Darling Downs. | Mount Larcom. | Kingaroy |
|---|---|---|---|---|---|---|---|
| DAIRY PRODUCE— | | | | | | | |
| Butter | 90 | 83 | 82 | 82 | 83½ | 80 | 83 |
| Cheese | 60 | 55 | 57 | 50 | 58 | .. | 53 |
| Eggs | 20 | 9 | 18 | 16 | 15 | 6 | 12 |
| Totals | 170 | 147 | 157 | 148 | 156½ | 86 | 148 |
| FOODS— | | | | | | | |
| Hams, bacon, rolled and smoked beef and mutton | 50 | 35 | 40 | 37 | 38 | 36 | 40 |
| Fish—Smoked | 10 | 2 | 7 | 3 | 3 | 9 | .. |
| Lard, tallow, and animal oils | 20 | 15 | 18 | 15 | 17 | 15 | 18 |
| Honey and by-products | 20 | 8 | 18 | 13 | 14 | 12 | 16 |
| Confectionery (home made) | 10 | 4 | 8 | 6 | 7 | 8 | 6 |
| Bread, scones, cakes, and biscuits (home made) | 10 | 6 | 7 | 5 | 6 | 6 | 6 |
| Totals | 120 | 70 | 98 | 79 | 85 | 86 | 86 |
| FRUITS, VEGETABLES, AND ROOTS (Fresh and Preserved)— | | | | | | | |
| Fresh fruits | 60 | 30 | 52 | 32 | 32 | 40 | 30 |
| Preserved fruits, jams, and jellies (home made) | 30 | 19 | 27 | 26 | 24 | 26 | 21 |
| Crystallised and dried fruits (home made or dried) | 20 | 12 | 18 | 15 | 16 | 15 | 14 |
| Preserved and dried vegetables | 10 | 7 | 9 | 7 | 8 | 9 | 8 |
| Fresh vegetables | 20 | 14 | 18 | 12 | 14 | 16 | 10 |
| Table pumpkins, squashes, and marrows | 6 | 6 | 5 | 5 | 4 | 4 | 4 |
| Potatoes, English and sweet | 40 | 16 | 38 | 30 | 18 | 24 | 28 |
| Roots and their products | 14 | 6 | 11 | 8 | 10 | 7 | 6 |
| Cocoanuts, peanuts, and other nuts | 10 | 5 | 8 | 6 | 7 | 3 | 8 |
| Vegetable seeds | 10 | 5 | 6 | 8 | 5 | 4 | 7 |
| Totals | 220 | 120 | 192 | 149 | 138 | 148 | 136 |
| GRAIN, &C.— | | | | | | | |
| Wheat | 50 | 45 | 30 | 28 | 33 | 28 | 35 |
| Flour, bran, pollard, macaroni, and meals | 10 | 3 | 2 | 6 | 6 | 5 | 4 |
| Maize | 50 | 41 | 39 | 37 | 35 | 30 | 48 |
| Maizena, meals, starch, glucose, and cornflour | 10 | 2 | 4 | 4 | 7 | 6 | 8 |
| Oats, rye, rice, barley, malt, pearl barley, and meals | 30 | 19 | 27 | 21 | 25 | 25 | 23 |
| Totals | 150 | 110 | 102 | 96 | 106 | 94 | 118 |

DISTRICT EXHIBITS ("B" GRADE)—*continued.*

| — | Possible points. | Oakey. | Brisbane Valley. | Nanango. | Northern Darling Downs. | Mount Larcom. | Kingaroy. |
|---|---|---|---|---|---|---|---|
| WOODS— | | | | | | | |
| Woods, dressed, undressed, and polished | 25 | 7 | 25 | 21 | 14 | 12 | 10 |
| Wattle bark | 15 | 3 | 15 | 6 | 4 | 3 | 12 |
| Totals | 40 | 10 | 40 | 27 | 18 | 15 | 22 |
| HIDES (1) AND HOME PRESERVES— | | | | | | | |
| Skins for domestic use | 15 | 14 | 14 | 14 | 15 | 15 | 15 |
| TROPICAL PRODUCTS— | | | | | | | |
| Sugar-cane | 60 | 4 | 25 | 12 | 6 | 11 | 8 |
| Coffee, tea, and spices | 10 | .. | 8 | 4 | 5 | 7 | 6 |
| Cotton (raw) and by-products | 30 | 20 | 27 | 25 | 23 | 26 | 24 |
| Totals | 100 | 24 | 60 | 41 | 34 | 44 | 38 |
| MINERALS— | | | | | | | |
| Gold, silver, copper, and precious stones | 25 | .. | 15 | 12 | 12 | 22 | 14 |
| Coal, iron, and other minerals, and salt | 30 | 15 | 20 | 15 | 15 | 16 | 15 |
| Totals | 55 | 15 | 35 | 27 | 27 | 38 | 29 |
| TOBACCO— | | | | | | | |
| Tobacco (cigar and pipe) in leaf | 20 | 14 | 17 | 15 | 14 | 13 | 16 |
| HAY, CHAFF, &C.— | | | | | | | |
| Hay—Oaten, wheaten, lucerne, &c. | 30 | 18 | 28 | 17 | 18 | 21 | 21 |
| Hay in sheaf | 5 | 3 | 3½ | 3 | 2½ | 4 | 2½ |
| Grasses and their seeds | 10 | 5 | 9 | 7 | 6 | 9 | 7 |
| Chaff—Oaten, wheaten, lucerne, &c. | 50 | 32 | 47 | 28 | 30 | 28 | 30 |
| Ensilage and cattle fodder | 20 | .. | 16 | 10 | 15 | 14 | 15 |
| Sorghums and millets in stalks | 10 | 5 | 8 | 9 | 6 | 6 | 6 |
| Commercial fibres, hemp, and flax | 15 | 3 | 12 | 8 | 5 | 6 | 6 |
| Pumpkins and green fodder | 12 | 7 | 10 | 8 | 6 | 11 | 6 |
| Broom millet | 10 | 6 | 8½ | 6½ | 6½ | 6 | 7 |
| Farm seeds | 13 | 11 | 11 | 11 | 7 | 10 | 6 |
| Totals | 175 | 90 | 153 | 107½ | 102 | 115 | 106½ |

DISTRICT EXHIBITS ("B" Grade)—*continued.*

| — | Possible points. | Oakey. | Brisbane Valley. | Nanango. | Northern Darling Downs. | Mount Larcom. | Kingaroy. |
|---|---|---|---|---|---|---|---|
| **Wool, &c.—** | | | | | | | |
| Scoured wool | 40 | 20 | 25 | 20 | 20 | 30 | 20 |
| Greasy wool | 60 | 50 | 30 | 40 | 60 | 45 | 40 |
| Mohair | 10 | 4 | 9 | 7 | 9 | 7 | 6 |
| Totals | 110 | 74 | 64 | 67 | 89 | 82 | 66 |
| **Enlarged Photographs** | 5 | 3 | 5 | 2 | 3 | 1 | 2 |
| **Ladies' and Schools Work and Fine Arts—** | | | | | | | |
| Needlework and knitting | 25 | 9 | 25 | 12 | 14 | 14 | 8 |
| School needlework | 5 | 1½ | 4½ | 3 | 3 | 1 | 1 |
| Fine arts | 5 | 3 | 3 | 3 | 5 | 5 | 5 |
| School work—Maps, writing, &c. | 10 | 8½ | 7½ | 9½ | 8 | 7 | 5 |
| Totals | 45 | 22 | 40 | 27½ | 30 | 27 | 19 |
| **Effective Arrangement—** | | | | | | | |
| Comprehensiveness of view | 20 | 14 | 18 | 16 | 18 | 18 | 16 |
| Arrangement of sectional stands | 25 | 19 | 21 | 16 | 15 | 16 | 15 |
| Effective ticketing | 10 | 6 | 8 | 7 | 6 | 7 | 6 |
| General finish | 25 | 18 | 23 | 19 | 19 | 19 | 16 |
| Totals | 80 | 57 | 70 | 58 | 58 | 60 | 53 |
| Grand Totals | 1,305 | 770 | 1,047 | 858 | 875½ | 824 | 854½ |

SUMMARY.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dairy produce | 170 | 147 | 157 | 148 | 156½ | 86 | 148 |
| Foods | 120 | 70 | 98 | 79 | 85 | 86 | 86 |
| Fruits, vegetables, roots | 220 | 120 | 192 | 149 | 138 | 148 | 136 |
| Cereals and by-products | 150 | 110 | 102 | 96 | 106 | 94 | 118 |
| Woods | 40 | 10 | 40 | 27 | 18 | 15 | 22 |
| Hides and home preserved skins | 15 | 14 | 14 | 14 | 15 | 15 | 15 |
| Tropical products | 100 | 24 | 60 | 41 | 34 | 44 | 38 |
| Minerals | 55 | 15 | 35 | 27 | 27 | 38 | 29 |
| Tobacco | 20 | 14 | 17 | 15 | 14 | 13 | 16 |
| Hay, chaff, fodder, &c. | 175 | 90 | 153 | 107½ | 102 | 115 | 106½ |
| Wool, &c. | 110 | 74 | 64 | 67 | 89 | 82 | 66 |
| Enlarged photographs | 5 | 3 | 5 | 2 | 3 | 1 | 2 |
| Ladies' and school work and fine arts | 45 | 22 | 40 | 27½ | 30 | 27 | 19 |
| Effective arrangement | 80 | 57 | 70 | 58 | 58 | 60 | 53 |
| Totals | 1,305 | 770 | 1,047 | 858 | 875½ | 824 | 854½ |

## ONE FARM.

### THREE EXCELLENT ENTRIES.

Giving the dweller of crowded suburban streets a comprehensive insight into the manifold activities of the farmer's daily life and the wealth he wrests from furrow and field, the one-farm exhibits were one of the most instructive features of Brisbane's annual festival. Three magnificent exhibits were displayed in the pavilion this year, and fourteen judges were engaged in the arduous task of adjudication.

The winner was found in W. D. Ponton (Tuggerah) with 467 points; J. T. Whiteway (Buderim) was placed second with 427½ points, and J. Beck (Stanwell) third with 421 points. Details:—

| | Possible Points. | J. T. Whiteway. | J. Beck. | W. T. Ponton. |
|---|---|---|---|---|
| PRODUCE— | | | | |
| Butter | 25 | 21 | 20 | 20 |
| Eggs | 5 | 1½ | 3 | 5 |
| Totals | 30 | 22½ | 23 | 25 |
| OODS— | | | | |
| Hams, bacon | 20 | 16 | 17 | 18 |
| Corned, other meats | 10 | 5 | 4 | 4 |
| Honey and by-products | 15 | 11 | 8 | 9 |
| Beeswax | 5 | 3 | 3 | 3 |
| Bread, scones | 5 | 4 | 3 | 3 |
| Confectionery and sweets | 5 | 4 | .. | 4 |
| Home cookery | 7 | 6 | 4 | 4 |
| Lard, tallow, &c. | 5 | 4 | 3 | 4 |
| Totals | 72 | 53 | 42 | 49 |
| FRUITS, VEGETABLES, AND ROOTS— | | | | |
| Fresh fruits | 25 | 22 | 15 | 20 |
| Preserved fruits, jam, and jellies | 15 | 13 | 12 | 14 |
| Crystalised and dried fruits | 10 | 8 | 7 | 9 |
| Preserved and dried vegetables | 15 | 12 | 9 | 14 |
| Fresh vegetables | 15 | 12 | 11 | 13 |
| Table pumpkins | 10 | 7 | 5 | 9 |
| Potatoes, English and sweet | 20 | 7 | 13 | 16 |
| Cocoanuts and nuts | 7 | 6 | 3 | 2 |
| Vegetable seeds | 5 | 3 | 2 | 5 |
| Roots, all kinds | 15 | 8 | 5 | 12 |
| Home made meals | 3 | 3 | 3 | ½ |
| Totals | 140 | 101 | 85 | 114½ |
| GRAIN, &C.— | | | | |
| Wheat | 25 | 4 | 7 | 15 |
| Maize | 25 | 19 | 14 | 23 |
| Barley, oats, &c. | 20 | 4 | 9 | 19 |
| Home made meals | 10 | 7 | 7 | 7 |
| Totals | 80 | 34 | 37 | 64 |
| TROPICAL PRODUCTS— | | | | |
| Sugar-cane | 30 | 15 | 14 | 8 |
| Cotton in seed | 20 | 14 | 19 | 16 |
| Coffee | 6 | 3 | 4 | 5 |
| Totals | 56 | 32 | 37 | 29 |

ONE FARM—*continued.*

| | Possible Points. | J. T. Whiteway. | J. Beck. | W. D. Ponton. |
|---|---|---|---|---|
| TOBACCO— | | | | |
| Tobacco leaf .. .. .. .. .. | 10 | 6 | 8 | 7 |
| HAY, CHAFF, &c.— | | | | |
| Hay .. .. .. .. .. | 20 | 7 | 13 | 17 |
| Hay in sheaf .. .. .. .. .. | 5 | 3 | 4 | 5 |
| Grasses and seeds .. .. .. .. | 10 | 6 | 8 | 7 |
| Chaff .. .. .. .. .. | 20 | 12 | 17 | 10 |
| Ensilage .. .. .. .. .. | 15 | 3 | 13 | 3 |
| Cattle fodder .. .. .. .. .. | 15 | 11 | 12 | 12 |
| Sorghum and millet .. .. .. | 10 | 6 | 6 | 9 |
| Broom millet .. .. .. .. .. | 10 | 6 | 9 | 6 |
| Farm seeds .. .. .. .. .. | 7 | 6 | 5 | 6 |
| Flax and hemp .. .. .. .. | 10 | 10 | 6 | 7 |
| Totals .. .. .. .. | 122 | 70 | 93 | 82 |
| WOOL— | | | | |
| Greasy .. .. .. .. .. | 20 | 15 | 16 | 14 |
| Mohair .. .. .. .. .. | 5 | 3 | 5 | 5 |
| Totals .. .. .. .. | 25 | 18 | 21 | 19 |
| DRINKS, &c.— | | | | |
| Home-made beverages .. .. .. | 15 | 13 | 10 | 7½ |
| WOMEN'S AND CHILDREN'S WORK— | | | | |
| Needlework and knitting .. .. .. | 10 | 9 | 4 | 4½ |
| Fine arts .. .. .. .. .. | 5 | 3 | 2 | 5 |
| Fancy work .. .. .. .. .. | 15 | 7 | 10 | 4 |
| School work, maps, writing, &c. .. .. | 5 | 4 | 3 | 2 |
| School needlework .. .. .. .. | 5 | 1½ | 4 | 3 |
| Totals .. .. .. .. | 40 | 24½ | 23 | 18½ |
| MISCELLANEOUS ARTICLES OF COMMERCIAL VALUE .. .. .. .. .. | 10 | 10 | 8 | 8 |
| PLANTS AND FLOWERS, IN POTS, AND GARDEN SEEDS .. .. .. .. .. | 6 | 6 | 1 | 2½ |
| TIME AND LABOUR-SAVING ARTICLES .. .. | 10 | 10 | 2 | 4 |
| EFFECTIVE ARRANGEMENT— | | | | |
| Comprehensiveness of view .. .. | 10 | 7 | 8 | 9 |
| Arrangement of stands .. .. .. | 10 | 8 | 7 | 9½ |
| Effective ticketing .. .. .. .. | 5 | 2½ | 3 | 4½ |
| General finish .. .. .. .. .. | 15 | 10 | 13 | 14 |
| Totals .. .. .. .. | 40 | 27½ | 31 | 37 |
| Grand Totals .. .. .. | 656 | 427½ | 421 | 467 |

ONE FARM—*continued.*

| | Possible Points. | J. T. Whiteway. | J. Beck. | W. D. Ponton. |
|---|---|---|---|---|
| **SUMMARY.** | | | | |
| Dairy produce | 30 | 22½ | 23 | 25 |
| Foods | 72 | 53 | 42 | 49 |
| Fruit, vegetables, roots | 140 | 101 | 85 | 114½ |
| Cereals and by-products | 80 | 34 | 37 | 64 |
| Tropical products | 56 | 32 | 37 | 29 |
| Tobacco | 10 | 6 | 8 | 7 |
| Hay, chaff, fodder, &c. | 122 | 70 | 93 | 82 |
| Wool | 25 | 18 | 21 | 19 |
| Drinks, &c. | 15 | 13 | 10 | 7½ |
| Women's and children's work | 40 | 24½ | 23 | 18½ |
| Miscellaneous articles of commercial value | 10 | 10 | 8 | 8 |
| Plants and flowers, in pots, garden seeds | 6 | 6 | 1 | 2½ |
| Time and labour-saving articles | 10 | 10 | 2 | 4 |
| Effective arrangement | 40 | 27½ | 31 | 37 |
| Totals | 656 | 427½ | 421 | 467 |

PLATE 116.—THE VICE-REGAL VISITORS WERE KEENLY INTERESTED IN THE JUDGING. In the picture are Lord Stonehaven (congratulating a successful exhibitor); Sir John Goodwin, Mr. H. S. Cribb, and Mr. Ernest Baynes.

# MILKING TESTS.

## RECORD ENTRIES FOR AUSTRALASIA.

Certainly an Australasian record for entries was created this year in the big milking contests at the showgrounds.

Messrs. L. F. Anderson (senior herd tester) and A. Hossack (herd testing officer) of the Department of Agriculture and Stock said that tremendous interest had been taken in the contests by all the breeders. Although no records in production had resulted, the standards generally had been well maintained.

In the heavyweight milk class the highest yield was produced by Mr. A. J. Caswell's Rosie IV. of Greyleigh, the amount for the twenty-four hours being 76.9 lb. of milk. Although this is not a record for the Brisbane showgrounds, the figures were specially good, as the cow was above the standard.

The same cow also gained the championship for butter production on the ground, providing 2.774 lb. of butter fat for the twenty-four hours. This fine cow is well known on many showgrounds in the State, and her big victories are all the more meritorious in view of her age.

Messrs. E. Burton and Sons' Jerseys put up some fine performances and scored several successes.

Cow, four years old or over, averaging the greatest daily yield of butter fat for 48 hours. Points for lactation period being conceded.

| — | Total Yield Milk, lbs. | Total Yield Butter Fat 48 hours. | Average Yield Butter Fat 24 hours. | Points. | Lact. Points. | Total Points. |
|---|---|---|---|---|---|---|
| A. J. Caswell's Rosie IV. of Greyleigh (I.M.S.) .. | 153·8 | 5·5481 | 2·7740 | 44·38 | Nil | 44·38 |
| A. T. Waters' Favourite II. of Railway View (I.M.S.) .. | 147·1 | 5·0782 | 2·5391 | 40·63 | 2·7 | 43·33 |
| W. M. Krause's Jennie IV. of Greyleigh (I.M.S.) .. | 102·8 | 4·3602 | 2·1801 | 34·88 | 5·0 | 39·88 |

Cow, four years or over, averaging the greatest yield of butter fat for 48 hours.

| | | | | | | |
|---|---|---|---|---|---|---|
| A. J. Caswell's Rosie IV. of Greyleigh (I.M.S.) .. | 155·8 | 5·5481 | 2·7740 | .. | .. | .. |
| A. T. Waters' Favourite II. of Railway View (I.M.S.) .. | 147·1 | 5·0782 | 2·5391 | .. | .. | .. |
| A. J. Bryce's Jewell II. of Rosemount (I.M.S.) .. | 123·2 | 4·9271 | 2·4635 | .. | .. | .. |

Cow, three years and under four, averaging the greatest daily yield of butter fat for 48 hours. Points for lactation period being conceded.

| | | | | | | |
|---|---|---|---|---|---|---|
| J. Phillip's Evelyn of Sunnyview (I.M.S.) .. .. | 149·0 | 4·9209 | 2·4604 | 39·7 | Nil | 39·37 |
| T. G. O'Mears' Belle III. of Royston (I.M.S.) .. | 83·5 | 3·6075 | 1·8037 | 28·86 | 10·0 | 38·86 |
| A. J. Caswell's Model of Dnalwon (I.M.S.) .. | 118·7 | 4·5038 | 2·2519 | 36·03 | Nil | 36·03 |

Cow, three years and under four years, averaging the greatest daily yield of butter fat for 48 hours.

| | | | | | | |
|---|---|---|---|---|---|---|
| J. Phillips' Evelyn of Sunnyview (I.M.S.) .. .. | 149·0 | 4·9209 | 2·4604 | .. | .. | .. |
| A. J. Caswell's Model of Dnalwon (I.M.S.) .. | 118·7 | 4·5038 | 2·2519 | .. | .. | .. |
| Hickey and Son's Bella VI. of Thornleigh (I.M.S.) .. | 114·0 | 4·0048 | 2·0024 | .. | .. | .. |

Heifer, under three years, averaging the greatest daily yield of butter fat for 48 hours. Points for lactation period being conceded.

| | | | | | | |
|---|---|---|---|---|---|---|
| A. J. Caswell's Ivo II. of Dnalwon, (I.M.S.) .. | 93·5 | 3·6728 | 1·8364 | 29·38 | 6·8 | 36·18 |
| E. Burton and Son's Oxford Daffodil (Jersey) .. .. | 82·7 | 4·3963 | 2·1981 | 35·17 | Nil | 35·17 |
| E. Burton and Son's Oxford Model (Jersey) .. .. | 68·7 | 4·1803 | 2·0901 | 33·44 | Nil | 33·44 |

MILKING TESTS—*continued.*

Heifer under three years old, averaging the greatest average of butter fat for 48 hours.

| — | Total Yield Milk, lbs. | Total Yield Butter Fat 48 hours. | Average Yield Butter Fat 24 hours. | Points. | Lact. Points. | Total Points. |
|---|---|---|---|---|---|---|
| E. Burton and Son's Oxford Daffodil (Jersey) .. .. | 82·7 | 4·3963 | 2·1981 | .. | .. | .. |
| E. Burton and Son's Oxford Model (Jersey) .. .. | 68·7 | 4·1803 | 2·0901 | .. | .. | .. |
| R. Mears' Sadie II. of Morden (I.M.S.) .. .. | 106·7 | 3·9399 | 1·9699 | .. | .. | .. |

Jersey cow or heifer, any age, averaging the greatest daily yield of butter fat for 24 hours.

| | | | | | | |
|---|---|---|---|---|---|---|
| E. Burton and Son's Oxford Daffodil .. .. .. | 82·7 | 4·3963 | 2·1981 | .. | .. | .. |
| J. F. Burnett's Fanny of Rosehill .. .. .. | 88·7 | 4·3367 | 2·1683 | .. | .. | .. |
| E. Burton and Son's Oxford Model .. .. .. | 68·7 | 4·1803 | 2·0901 | .. | .. | .. |

Martin Snelling prize for the dairy cow producing the greatest quantity of butter fat in 273 days.

J. Phillips' Evelyn of Sunnyview, 567·62.

Hickey and Son's College Princess Pontiac, 534·24.

W. Spresser and Son's Carnation Lucy's Locket, 503·92.

Cow yielding the largest supply of milk in 48 hours under Babcock test.

A. J. Caswell's Rosie VI. of Greyleigh, 153·8 lb.

J. Phillips' Evelyn of Sunnyview, 149·0 lb.

A. T. Waters' Favourite II. of Railway View, 147·1 lb.

Royal National Champion butter fat test for purebred cow or heifer averaging the greatest daily yield of butter fat for 48 hours.

A. J. Caswell's Rosie VI. of Greyleigh (I.M.S.), 44·38 points.

A. T. Waters' Favourite II. of Railway View (I.M.S.), 43·33 points.

## DISTRICT FRUIT CONTEST.

The Palmwoods fruitgrowers were jubilant on winning the prize for district fruit competitions, for which there were seven entries. Montville secured second position, and Woombye the third prize. Details:—

| — | Possible Points. | Buderim. | Cooran. | Gayndah. | Montville. | Palmwoods. | Redlands. | Woombye. |
|---|---|---|---|---|---|---|---|---|
| Bananas .. .. .. | 35 | 29 | 34 | .. | 27 | 31 | 24 | 29½ |
| Pineapples .. .. .. | 35 | 32 | 23 | .. | 30 | 35 | 33 | 35 |
| Citrus .. .. .. | 35 | 22 | 15 | 31 | 32 | 31½ | 28 | 27 |
| Custard apples .. .. | 10 | 8 | 6 | .. | 8 | 8 | 10 | 5 |
| Papaws .. .. .. | 10 | 7 | 7 | 3 | 9 | 8 | 10 | 8 |
| Strawberries .. .. | 10 | 7 | 6 | .. | 7 | 9 | 8 | 6 |
| Other fruits .. .. | 10 | 7 | 6 | 3 | 7 | 8 | 8 | 8 |
| Grading and packing in export classes .. .. | 35 | 28⅓ | 21½ | 11 | 29⅙ | 31 | 29⅔ | 29⅔ |
| General display .. .. | 20 | 16½ | 14½ | 17 | 17 | 18 | 13½ | 16½ |
| Totals .. .. | 200 | 156⅚ | 133 | 65 | 166⅙ | 179½ | 163⅚ | 164⅔ |

## PINEAPPLE AND BANANA SHIELDS.

The Woombye fruitgrowers secured the shield offered for the display of pineapples, and Cooran again secured that for bananas. Particulars of the awards are as follows:—

PINEAPPLES.

| | Canned for Export. | Quality. | Grading. | Packing. | Total. |
|---|---|---|---|---|---|
| Possible points | 30 | 42 | 14 | 14 | 100 |
| Buderim | 25½ | 24 | 10½ | 11 | 71 |
| Cooran | 23 | 20 | 6 | 7 | 56 |
| Montville | 25½ | 12½ | 9 | 8½ | 55½ |
| Palmwoods | 30 | 32 | 11 | 11 | 84 |
| Redlands | 26½ | 32 | 13 | 13 | 84½ |
| Woombye | 30 | 33 | 13 | 13 | 89 |

BANANAS.

| | Quality. | Grading. | Packing. | Total. |
|---|---|---|---|---|
| Possible points | 50 | 25 | 25 | 100 |
| Cooran | 40 | 22 | 23 | 85 |
| Palmwoods | 37 | 22 | 21 | 80 |
| Woombye | 37½ | 20 | 20 | 77½ |
| Buderim | 33 | 22 | 22 | 77 |
| Montville | 34 | 19 | 17 | 70 |
| Redlands | 32 | 20 | 15 | 67 |

## FRUIT PACKING.

### CHILDREN'S COMPETITION.

A class in the district fruit exhibition of paramount interest to the school children concerned was the children's fruit-packing competition, which carried with it the McDonald Shield, awarded each year for the highest average points. The competitors must be past or present pupils of the fruit-packing classes conducted by the Department of Public Instruction. Out of nine entries received this year there were only four State schools competing—viz., Buderim Mountain, Flaxton, Montville, and Palmwoods. These competitors were children who are now attending the packing classes, and are not more than 14 years old. There was also another class for past and present pupils of packing classes over 14 years and not exceeding 17 years old. In this class there were three State schools competing—two entries from Buderim Mountain, two from Flaxton, and one from Palmwoods. In connection with the latter competition, only one competitor (Palmwoods) had complied with clause 4 of the regulations, which reads:—"Packing to be diagonal plan; one case to be packed with wrapped, the other with unwrapped oranges." In the other class, for pupils at present attending the fruit-packing classes, not one of the four competitors had complied with clause 4, and the fact should be noted by those concerned that each school loses 100 points through not complying with the conditions laid down. The neglect in this regard is unfortunate, as the organisers of this important class consider that the packing this year was, on the whole, the best packing so far seen in connection with this competition, and the task of the judge in deciding which school should be entitled to retain the much-coveted McDonald Shield for the next twelve months was a difficult one. The cases of oranges were certainly admirably packed, notwithstanding that they were not packed diagonally, as laid down in the regulations, and the juvenile competitors are bidding fair to become useful members of the fruit distribution and packing associations in their respective districts later on.

## PIONEER DROVERS.

Mr. S. E. Pearson, of Camberly, Greenmount, Queensland, writing to the Editor of the "Pastoral Review" (July) on the subject of the article on Pioneer Drovers —reprinted in the Journal from "The Review" in the last issue—adds these interesting notes:—

I have read with much appreciation Mr. Wilfred Steele's article on Pioneer Drovers in the current issue of "The Review." All that he says is true. We still have many good drovers in Queensland, such as Dick Haynes, of Longreach, and Charlie Gallagher, of Hughenden—men who have spent all their lives on the road with stock—but the day of those long-distance trips is over.

Alfred Giles, who was so well known in the Northern Territory, and who might justly claim the honour of having accomplished the longest and most successful journey with stock in Australia, was a brother of Ernest, the explorer. Splendid men those Giles brothers!

The writer was among those who left the Victoria River with the exodus of cattle that took place in 1904. The season was good throughout the interior during that year, and close upon 40,000 head of cattle must have left the Territory. Alexandria, Brunette, and other tablelands runs also sent cattle south that year.

Blake Miller and "Jumbo" Smith, each with 1,000 Victoria River Downs cows, bound for Queensland, broke the trail for the long column of cattle marching east. Following them came J. R. Skuthorpe with 3,000 Wave Hill bullocks, and behind him Charlie Phillott with 3,000 Wave Hill cows, all bound for Killarney Station, Narrabri, New South Wales. Steve Lewis followed with another 1,000 bullocks from Buchanan's Wave Hill Station, bound for Adelaide, via Newcastle Waters and Alice Springs.

Blake Miller led the way across the Murranji Desert to Newcastle Waters and Anthony's Lagoon, and a great bushman and unerring pilot he proved to be. Each morning at daybreak he speared his cattle into the eye of the rising sun, and we followed on his track across the waste for 400 miles.

The cattle that Smith and Miller brought from Victoria River Downs were destined for Austral Downs, and Blake Miller managed that property for Sir Sidney Kidman up till the time that it was purchased by C. J. Brabazon.

The writer left Skuthorpe's cattle at Austral Downs and pushed on to Adelaide via the Birdsville-Hergott track, reaching Hergott Springs on the same date that Steve Lewis arrived with his 1,000 bullocks from Wave Hill, via Alice Springs. Two thousand bullocks—1,000 each from Augustus Downs and Lorraine Stations, on the Leichhardt River—reached Hergott from Queensland at the same time, and were offered for sale there along with the Wave Hills.

What a muster of well-known cattlemen there was that day on the saltbush plain that spreads between the township and the Frome River! The late John Barker (of Barker Bros., Adelaide) auctioned the cattle from the vantage point of a buckboard drawn up on the plain. All around grazed 3,000 bullocks, dappling the sunlit landscape with their many-coloured hides. W. F. Buchanan (brother of Nathaniel, the grand pioneer who had done so much for Northern Australia) was there to see his cattle sold; and Sidney Kidman, who bought most of them, had fewer grey hairs in his beard then than he has now.

Wilfred Steele, who was with Steve Lewis, mentions that 95 miles was the longest dry stage that their cattle had on their march across the continent; but Steve (a brother of the Hon. John, M.L.C., who at that time owned Newcastle Waters Station) told the writer that he considered his cattle had accomplished one stage of 108 miles without water. It was in June of that year, and cool weather, else they must have perished. Nevertheless, 60 per cent. of Lewis's cattle were fit for the butcher when he delivered them at Hergott Springs.

The following year Walter Rose went out to lift 4,000 head of Lumley Hill's Lissadell cattle, and he had a terrible time getting back to Queensland. The writer was in Camooweal the day that Rose's plant passed through on its way to Western Australia. In the interim drought had closed the Murranji track, and Rose was forced northward through the Delamere country to the Roper River. He was two and a-half years on the road back to Queensland.

During recent times the indomitable old Walter has been keeping a hotel at Cloncurry. Jack Skuthorpe took up a skelp of country in the Northern Territory, off the head of the Nicholson River, in 1907, and died there of Gulf fever shortly after. Charlie Phillott (brother of Edward, of Colane, Winton) settled in the Charleville district, and has done well.

# THE CULT OF THE COLT.

By "U9L."*

## THE PERFECT HACK.

BEFORE leaving the matter of breaking and handling it mightn't be out of place to devote a minute or two to what constitutes the perfect hack.

Exception might be taken to the use of the word "hack." Almost it is right that fault should be found. A hack is usually associated with the show ring, and these fellows to which I refer may never see a ring in their lives. They're the boys, though, that take us there and bring us back, that carry us long miles under the baking sun and on moonless nights, when not a glimmer of light is to be seen. They carry us over country that would break the show-ring champion's heart and our neck, and they take us through scrub at a gallop through which the other fellow couldn't see daylight. These are the horses on which we do our daily work, who wheel cattle and slug after sheep. In fact, and in short, they're just ordinary station horses who prop up the country from behind without ever getting the cheers of multitudes or sharing the limelight. You know them, and I know them, and we both love 'em.

### A Good Horse must be Easy to Catch and Lead.

The first point to consider is the catching. The perfect horse must be easy to catch anywhere at all—in the yard among others, in the open among his mob, and anywhere at all. He should present his head for capture and stand still while the bridle is being slipped on him. Of course, I know that many jewels of horses are rogues to catch. A perfect camp horse, when the cattle are on camp, may take more wheeling than a good intention. But that's only a form of perverted humour on the part of the old fellow. He knows what's on, and I honestly believe he's laughing to himself all the time while he evades our clumsy efforts to get him. For mine own part I make rather a hobby of catching my horses by putting my hand on their rumps first. I know it's silly, but I do it, and I've ridden some peerless gems of horses. It's a spirit of camaraderie, I think, which prompts an approach in that fashion. Anyway, it's wrong, and the fault is mine, not the horse's.

A horse that lugs on the bridle when being led is not, and cannot be, perfect. It should step free behind you—abreast of you for choice—and it should come willingly wherever you elect to go.

### "Morally Tied."

It should stay put wherever and whenever you decide to leave it. If it's only tied by a string, that bit of twine should be sufficient to hold it in its place. If it does break away, then it should take but the few steps which the shock has prompted and then halt and stay still. By the way, when breaking in it's a good plan to use a bridle with a long pair of reins. At every opportunity drop those reins on the ground and go and leave your charge. He won't take many strides after his fancied release before he treads on those reins and snags his mouth. The first few lessons may achieve little, but in a remarkably short time that colt understands with the reins lying on the ground virtually he's tied to a post. And it has the same moral effect, too! I've seen a mob of bush horses race by a little mare of mine who was standing with the reins dangling. All she did was to call to them as they passed and pivot on the spot to which she was morally tied.

### Play the Game Fair.

In the exercise of saddling and mounting I want you to understand that when I say a horse should stand still I mean it only within reasonable limits. A little bit of a step, or an impatient stride or two, shouldn't condemn a horse. Hang it all, put yourself in that fellow's place and imagine his keenness. Think to yourself how you sometimes want to get to a job and irk at the delay. That fellow doesn't mean any harm when he wants to move before you're ready, and instead of swearing at him for his impatience just curse your own dilatory actions. Play the game fair, even if it is only with a horse. A bit of a stride while you're mounting, though it's not in the lexicon of perfection, isn't any harm so long as that stride swings towards and under you. It's when the horse swings away from you that you want to check him, and mind your own P's and Q's as you mount.

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*In the "Pastoral Review" for July, 1929. Previous notes by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, March, April, May, and June (1929) Journals from the February, April, May, July, September, October, December, (1928), January, February, and May (1929) numbers of the "Pastoral Review."

Having mounted, and without worrying about with which foot the horse leads, let us consider paces. Some people run away with the idea that hacks are born. Some believe in heredity. Others give the balance of power to environment. We're not going to argue now, but I firmly believe that, while heredity has its influence to a certain extent, hacks are made by the man who rides them. Let me quote the following in support of my statement. I've broken mobs, and I've ridden multitudes off the breaker's hands. Absolutely without exception every horse I rode exclusively from the breaking was a good and fast walker. And let me whisper my shame, almost without exception they cantered like unto a three-legged trestle in action! I don't know how it was done, and I don't know what means I employed to that end. I did it unconsciously, therefore I can take no credit to myself, and neither should I shoulder the blame.

### Paces Aren't Everything.

If you'll accept that lot we'll proceed. But paces aren't everything, though many people run away with that idea. Keep your perfect pacer, and give to me a horse that's responsive in the mouth, that reads your lightest whim and interprets your wishes with accuracy. A pacer may carry you in comfort, but the other fellow is with you in spirit and body, and at the end of the day that twain are better physically than the former disunited units.

And level with that paragon I'd place the horse that goes straight! There's a charm about this, a delight and a pleasure that many men miss. You'll see a horse, otherwise perfect in all his paces, that wants the whole road to himself. He'll waddle and shuffle and lug to this side and that, and he can't go straight. That's an abomination and a curse. I can't tell you how to cure a horse so afflicted, and I doubt there is a remedy. But I can tell you a preventive, or, rather, the cause of the trouble. It is brought about by the rider hanging on to the horse's head when he's a colt. He won't give the thing a free rein and let it go easy, and the colt learns to chafe against the leaden hold by waddling. That's the cause. You may sense the preventive for yourselves.

### A Straight Goer.

A horse that goes straight is one of the first considerations of perfection. Many people run away with the idea they want a twister and a dodger for scrub riding. That's an erroneous myth. If you get a horse that props and doubles, that isn't game to go straight, then you and that horse are going to part company—you'll be impaled on one bough and the horse will be lying at the bottom of the tree. Above everything else, a scrub horse must be able and game to go straight. He's got to swing and swerve, of course, and often he's got to be so nippy that his shadow's got to move lively not to be left behind. But he must be able to go straight. That twisting business is learned later; the ability to go straight is the keystone of the job.

Now let us have a look at this horse's paces. It goes without saying that a horse should have easy paces, springy, and with a movement that denotes a joy of life. That's a pleasure for both parties—the mount and the rider. But an essential for perfection is that the horse must be able to hold that pace whatever it is. For instance, you're riding along, the reins hanging free, and your horse is walking. He knows, and you know, the peculiar little action by which you urge him to another pace, be it trot or canter. But while that horse is walking he mustn't break. Force him as much as you will, that horse retains that particular pace until the magic signal is given which indicates a trot or canter. That sort of thing shows training on the part of the man and an ability to assimilate that training on the part of the horse. Though it's only a little thing, a horse shouldn't break when crossing a gully or creek. Yet how many times will you see it hold its pace? Please don't forget the ability to go straight—that's particularly an essential if you head your mount across the downs and ride at ease.

### The Intelligent Mount.

The next thing necessary, and please understand I'm placing these objects at random and without any given order of precedence, is that the mount must take an intelligent interest in where it's going and what it's doing. Often you'll find horse and rider in perfect communion one with the other. The man knows the point at which he's aiming, and by a dozen and some more indications does the horse express a similar knowledge. That's a pleasure to the rider, and anything which adds to his ease and comfort helps to form perfection in his mount. Such a horse takes note of where it's going. It doesn't put its feet in holes and blunder over tussocks. It may deviate round a rough place, and when past that obstruction it'll shake its head,

prick its ears, and pick up the line again. Doesn't that make a man feel a pride in his mount? Doesn't that let him know he's not riding a slave? And doesn't that, or shouldn't it, give him pleasure?

Some horses are born turners, some acquire the art, and some come a crash. We must have a horse capable of turning in a flick of time and a dash of space. He must keep his legs under him and have perfect command of himself while he does it, too. There's only one way—he must turn on his hind legs. He must gather his hind legs under him, sit on his hocks, as it were, and wheel as if on an axle. When he's done that he's in a position to spring off his tail and not lose a speck of pace. Horses that prop and wheel on their front legs seem to have a notion that they're ideal turners, and won't learn any other way if they're set at all in that forward turn. They take a pride in it, and there's a fall following that pride in the near future. A horse may be taught to turn properly by pulling him back on his haunches and swinging him round. That requires a strong hand on the rein and a herculean grip with the thighs. But it can be done, and it's worth while.

Tripping, shying, stumbling, and other abominations are disqualifying points. Though most men attempt corrective measures, as well it is to blow against thunder as try and cure those faults.

### A Horse Among Horses.

And last, though by no means least, our horse must be able to carry us. When the sweat's caked about his ears, and his breath comes in panting sobs, when his nerves and sinews are shivering from exhaustion, and his throbbing heart pounds against the calves of your legs, then must our mount hold his head high, prick his ears, take a fresh hold of the bit, and see you damned before he'll submit to the weariness which envelops him. Yea, then you have a horse among horses, and truly you're accursed for ever if you don't dismount, throw your arm round the little fellow's neck, and walk beside him for a mile or two to ease his tired muscles and aching body.

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Plate 117.—The King of the Ring.

# RURAL LIFE IN OTHER LANDS—IV.

By the EDITOR.*

## A JOURNEY TO GERMANY.

In this series it is proposed to confine our consideration more to national customs and to the economics of agriculture, rather than to cultural methods, for systems of husbandry in Europe, except as regards general principles, are more or less governed by local conditions and traditions—consequently much of what one was able to observe, in the course of a visit to Germany, after the war, in the way of field practice would be, I think, quite inapplicable to Queensland. With us, generally speaking, the conditions of country life are so different that there would be nothing gained by a dissertation on German methods of farming, but on the economic side the German farmer has made much noteworthy progress, and in view of the closer attention that is being given to agricultural economics in Queensland to-day, it is thought that a brief review of several points in rural economy that impressed rather forcibly an ordinary observer, preceded by a fleeting impression of a post-war journey from London to Germany by way of the old A.I.F. road, may be of some small interest.

### The Charm of London.

There is a magic and charm about London that one realises fully the moment he is leaving after some months of residence—a residence long enough to enable one to become fully conscious of the fascination of the Empire's centre.

The scene at Victoria Station was in marked contrast to those to which one had become accustomed at the end of his periodical ten days' leave during the years of war. There were no pathetic little family groups gathered round returning "Tommies," no kiddies saying good-bye to fighting fathers, perhaps for the last time, and no wives and no mothers smiling through their tears and demonstrating so quietly, and with such dignity, the wonderful bravery of the women of wartime England. There were no groups of casual Australian "Diggers" with ready though judicious retort to their natural enemies, the military police. Instead one found himself with a delicious sense of freedom in his "civvy" clothes, with not a uniform in sight except those of the policemen and railwaymen on duty. Then, on that sunlit summer morning came the journey by comfortable Pullman down through Kent, the garden of England, to Folkestone. How different from that first rail ride to Folkstone—the midnight rush by troop train from Amesbury through a driving snow storm across the south of England, then in the grip of the 1916 winter; the marshalling by leather-lunged but very efficient sergeant-majors on the ocean front parade of the old town that led down to the cross-channel boat, berthed at the breakwater. Outside was a steel-grey tumbling sea misted by showers of sleet, and a raw, cold gale blowing up Channel.

### A Contrast.

This time, in all the glory of a bright summer day, the Channel was as smooth as the Boat Passage leading from the river to Moreton Bay, and the crossing to France as pleasurable as the journey from Brisbane to Bribie on a windless spring morning. The coast of France was soon in sight, and then came into view the old familiar column of Napoleon's monument on the heights above Wimmereux, and shortly afterwards we glided quietly past the old breakwater and to the well-remembered Boulogne Quay. Here again one felt the contrast of the new order of peace. After passing through the Customs one could do what he liked. There was no yarding up by irritable transport officers, no military police to demand a pass, no toiling up the old via dolorosa—the way of sorrows and backaches—to the hungry camp on One Blanket Hill. After looking around on the old familiar sights, all one had to do (with no one to tell him how to do it and when to do it) was to board the tourist train for Paris. How luxurious its first-class compartments when compared with the old cattle trucks, "Chevaux 8, hommes 40"—that is to say, their capacity was eight horses or forty men—on which we used to make the journey back to the line; trucks on which every bolt had rattled loose and which seemed to travel on square wheels over a track that apparently had a bottom step at every rail joint. Veritably peace hath its victories!

### From Piccadilly to Picardy.

From Boulogne to Amiens the way was through very familiar country. The sea was in sight again at Etaples, the rails running along the shore on the border of the great war cemetery among the fir-forested sand dunes that are lapped lazily

*In a Radio Talk through 4QG.

by the never ending wave wash of tidal waters. Across tide-bared flats could be seen again the towers and gables, and the flaming red roof of the Casino of Paris Plage—the mecca of many "Diggers" when Etaples was the great training ground—or "bull-ring" as they called it. Abbeville, the old-world shell-shocked city, so well remembered by Australians, was the next halt; and from there on the way led up through the elm-shaded, wonderfully green valley of the Somme, past our old back-area resting places, on to Amiens, the old battered city on the gates of which the invaders knocked in vain in the wonderful and strenuous spring and summer of 1918, and now regaining some of its former prosperity. Here we elected to stay awhile, to renew old memories (and what memories!) and old acquaintances. It was a happy reunion.

From Amiens it was decided to continue our journey to Germany in a round-about way by car, over the old Somme battlefields to Mons, and thence by train to Charleroi, to Liege, and on to Rhineland, crossing the Belgian border near Aix-la-Chapelle. Over the roads as familiar to us as the road to Redcliffe, through country filled with haunting memories—a country now of blue, green, and scarlet enamel, splashed with red poppies and blue cornflowers, now scarred and desolate, showing deep wounds that even Nature, in all her wonderful artistry, could not camouflage successfully; through Villers-Bocage to Contay, and thence down the Hallue Valley through Behencourt, Frechencourt, to Querrieux, and thence once more on the cobbled road to Albert. How every detour in our route was welcomed!—to Blangy-Tronville, Daours, Corbie, Villers-Brettoneux, Mericourt, along the Somme through Bray to Peronne, and back again through Lagnicourt, Bullecourt, Noreuill Gully, Vaulx, and down to Bapaume. It was an old, old journey from Piccadilly to Picardy.

We must hasten on, though one is tempted strongly to linger by the way. When one passes an old tumble-down sandbag stronghold which one had helped to build in the days when sandbags seemed to be the most precious things on earth, the temptation to talk of old times and present contrasts becomes almost irresistible.

## The Road to the Rhine.

By easy stages, over old fighting areas, past old front-line "possies" and camping grounds, through Bapaume and Arras, Mons was reached, and from there our journey to Germany through Charleroi, Huy, and Liège, country already very familiar, was continued by rail. After crossing the frontier the way led through Aix-la-Chapelle over level plain lands on to Cologne, our temporary destination. The country, in some respects, reminded one of the Darling Downs, though, beyond its more or less featureless, level expanse, it was difficult to define the points of resemblance it vaguely suggested.

Germany is a very interesting country geographically. South Germany consists of the Alpine foreland from Lake Constance to the Valley of the Inn, a tributary of the Danube. In the west the frontier follows the crest of a mountain range, and along the Valley of the Moselle for some distance, and then runs roughly north. In the east it is more definitely physical, and is determined by the Bohmer Wald and other ranges, and the mountains beyond the Oder. Then it crosses a featureless plain in an irregular line trending somewhat to the north-east. South Germany thus consists of the Central Highlands, and North Germany of the plain to which they slope. In the east the winter is severe, while in the west it is comparatively mild. The Rhine basin has mild winters and early springs. The summer climate of North Germany is very much that of the Thames basin, both have an average July temperature of just over 62 degrees Fahrenheit. South Germany is warmer.

Magnificent forests cover the mountains of South Germany and parts of the northern plain, in all about one quarter of the surface of the country. About one half is under cultivation, the most fertile being the Upper Rhine country, the garden of Germany. Here the vine comes to perfection, yielding famous wines.

Much wheat is grown on this great plain, but in most other parts rye is the chief cereal. Potatoes are grown in enormous quantities in Northern and Central Germany. The sugar beet is an important staple in some districts. Hops are grown chiefly in Bavaria.

We may have spent overmuch time along the road, but as the way led through country that will be ever sacred to Australians, perhaps an apology for lingering so long is unnecessary. In the next lecturette of this series we will continue a hurried journey from the Belgian border to Cologne, down the Rhine to Dusseldorf and up that famous river to Mayence, and then lead on to a consideration of some aspects of agricultural economy that have interested the German farmer who, in this phase of farming, has accomplished some sound and striking results.

## SOILS.

*Summary of a lecture by Mr. G. J. Saunders, M.Sc., B.E., A.A.I.C., Principal of the Ipswich Technical College, at the June Pig Farmers' School, at the Queensland Agricultural High School and College, Gatton.*

The name "soil" is applied to the soft portions of the earth's crust produced by the weathering of rocks. Soils fall into one of two classes—(*a*) Derived from the solid rock immediately underneath, or (*b*) transported from one place to another by agencies such as the wind, running water, or even glaciers.

A soil of the first class passes gradually through the subsoil and rotten rock to the solid rock, and its composition is directly related to the parent rock, whereas the composition of a transported soil shows no such relation.

All rocks are divided into three main classes—(*a*) Igneous, (*b*) sedimentary, (*c*) metamorphic. Igneous rocks are those which have been formed by the solidification of molten masses derived from within the earth—e.g., granite at Stanthorpe, basalt on the Darling Downs.

Sedimentary rocks have been formed by the weathering of pre-existent rocks and the consolidation of the weathered material—e.g., sandstone around the College, and the shales of the Ipswich district. Metamorphic rocks are those that were originally igneous or sedimentary, but have been changed so that their original characteristics have been altered or even entirely effaced—e.g., the Brisbane schist in and around Brisbane.

Igneous rocks are subdivided into—(*a*) Plutonic, (*b*) volcanic, (*c*) hypabyssal. Plutonic rocks are those which have been formed by the cooling and solidification of the molten mass or magma within the earth's crust; such rocks cool slowly, and their mineral constituents are coarsely crystalline—e.g., granite (Stanthorpe).

Volcanic rocks have been formed by the solidification of the magma upon the earth's surface. These rocks are not always connected with volcanoes—e.g., at Vesuvius—but may be formed from the magma which has poured out quietly through cracks on to the earth's surface—e.g., the Deccan in India. Rocks of this type are finely crystalline to glassy—e.g., basalt (Darling Downs) trachyte (Fassifern district and the Glass House Mountains), rhyolite (Esk).

Hypabyssal rocks have been formed from the magma which has cooled very close to the earth's surface in cracks (dikes), &c.

The agencies by which the rocks are converted into soil are rain, frost, changes in temperature, wind, running water, and glaciers. Rain falling through the air dissolves from it small amounts of oxygen and carbon dioxide. When it falls on the rocks, it not only softens clayey portions and washes them away, but it attacks chemically the hard solid parts converting them into new compounds, some of which may dissolve in the water.

Water in changing to ice increases in volume and exerts a very great pressure. When a rock, the upper surfaces of which is saturated with water or which contains water in cracks or joints, is subjected to very low temperature, the water freezes to ice and exerts a powerful wedge-like action. This breaks the surface down into finer parts and widens the cracks and joints, enabling air and water to penetrate to greater depths. By repeated action the solid rock ultimately crumbles away and will eventually form soil.

Where a rock is exposed to great extremes in temperature, we find that they crack and fall to pieces. This is due to the fact that the different minerals of the rock expand unequally when heated by the sun's rays during the day and contract at different rates when they become cooled during the night.

Wind by itself has very little action on rocks, but, when it picks up particles of sand, it becomes a very abrasive agent. The wind also transports the light materials to other localities.

Running water, especially fast-flowing water, wears away all kinds of rocks and transports the material down the stream, forming alluvial flats and deltas. Fast-flowing rivers, especially in flood time, carry a large amount of matter in suspension, and they use this material to wear away the rocks along their sides and bottoms. The Nile carries in suspension 54,000,000 tons of solid matter per year, and in solution 17,000,000 tons per year. The Mississippi carries in suspension 406,000,000 tons, and in solution 120,000,000 tons per year. All this vast quantity of material has been derived from the weathering of rocks.

Glaciers, only known in very cold countries, are slow-moving streams of ice, Not only do they transport rock fragments on their surface, but, by means of similar fragments frozen in their lower layers, they wear away the solid rocks over which they pass. All this transported material becomes deposited where the glacier ends, and much of it is then carried away by the flowing water derived from the melting ice over large areas. We have evidence of soils formed by such action in Victoria, United States of America, Canada, and Europe.

All the above agents are Nature's chisels and planes, and they are continuously at work, acting slowly but surely. They convert the solid rocks into soil, unlocking from them the essential constituents so necessary for plant growth.

The physical nature and chemical character of a soil depend largely on the nature of the rocks from which it has been derived.

Granite alters considerably when weathered. The quartz grains are unaltered, but the other minerals pass into clay, iron oxides, &c. A residual soil derived from granite contains the quartz grains as sand, with more or less clay, and it is often stained yellowish or reddish by the iron compounds formed. It contains a very valuable plant food (potash) in a soluble form; such a soil is good for fruit-growing. Basalts pass to a clayey soil, without any quartz sand, coloured brownish or reddish owing to the abundance of iron compounds. With much organic matter, such a soil is coloured black. Such soils are usually poor in potash but relatively rich in phosphorus and lime. Trachyte and rhyolite give light-coloured soils, the former often clayey, comparatively poor, unless they are formed from the rarer varieties, such as in the Fassifern district, which contain potash and soda minerals.

Sandstones lose their cementing material and pass into sandy soils; shale into clayey soils, sometimes coloured dark by presence of organic matter.

Limestone rocks, formed from ancient accumulation of marine organisms such as corals and foraminifera, form light-coloured calcareous soils rich in carbonate of lime.

Plants and animals play a great part in the formation of soil—e.g., roots of trees split rocks, old stump holes and rabbit burrows permit freer access of air and rain, earth worms bring up the lower layers of soil on to the surface. Decaying vegetation adds organic matter to the soil and so increases the percentage of carbon dioxide in the soil, air, and water, and thus promotes more rapid decomposition of the minerals in the soil.

Man also changes the physical nature and composition of the soil by tillage, irrigation, drainage, rotation of crops, ploughing in of crops, addition of fertilisers, &c.

The lecture was well illustrated with lantern slides, photographs, and specimens of rocks and soils.

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## THE PAPAW.

By G. WILLIAMS, Instructor in Fruit Culture.

The Papaw or Papaya (*Carica papaya*), originally reported as being indigenous to Central America and West Indies, is freely distributed throughout coastal Queensland. The small herbaceous tree is practically branchless and surmounted by a crown of large palmate leaves, at the base of which the fruit is produced, this usually maturing after the fall of the foliage from that part of the stem where it is situated. The branchless habit of the tree can be varied by the removal in the early stages of terminal buds, whereby branching is induced and several fruiting heads developed.

### The Plant and its Properties.

The succulent flesh is very agreeable to the taste, though preferred by many with the addition of sugar, lemon, or orange juice, the fruit being cut transversely, the seeds removed, and such additions as preferred applied in its capacious cavity. The fruit is credited with containing properties which materially aid digestion, as also are the seeds, which resemble watercress in flavour. The foliage applied as a wrapper is said to have the effect of rendering meat tender—a feature that exists mainly in imagination. From incisions made with a bone or ivory knife in the unripe fruit, the milky juice exudes freely and is collected, dried, and exported from the West Indies and Ceylon to other countries where is is sometimes used as a substitute for pepsin. The demand is said to be limited and irregular.

Under favourable conditions, the first fruit are matured within twelve months from planting; location and rainfall are responsible for variations. The term of productiveness is short, seldom exceeding four years, but this to some extent is compensated by its unbroken continuity.

### Cultivation.

Fertile and well-drained soils are essential to successful cultivation. The most vigorous growth is evidenced and the finest fruit produced on volcanic scrub soils. The quality of the fruit varies under different conditions of soil, location, and humidity. Essentially a purely tropical product, the finest fruit are those matured without an excessive moisture. In some of the Northern scrubs Papaws are widely distributed, but under the influence of shade the trees are spindly and the fruit undersized and lacking in flavour. Fruit produced under semi-tropical conditions is admittedly inferior to the purely tropical product.

### Varieties.

Various types or varieties have from time to time been introduced into Queensland, but the typical features have by cross-fertilisation been almost eliminated. Two types introduced to the North worthy of mention are the New Guinea or "Long Tom" and the Cowleyii or "New Era" (said to have originated in the Philippines), both being bisexual. The elongated fruit of the former is not quite equal to the latter, but a heavier weight per tree is returned. Earlier introductions were confined to the original unisexual variety, which from a batch of seedlings frequently developed an excess of male and consequently practically unproductive plants, though occasionally the panicles of male flowers are interspersed with those capable of fruit production; the fruit of such are invariably small and inferior. Various suggestions, more or less absurd, have from time to time been published as infallible tests for determining the sex of the young plant, but experience does not favour the acceptance of any of them. Among a batch of seedling plants a wide variation in vigour will be noted, and a reversion of the usual practice of selecting the strongest plants should be applied, for it is found that the most vigorous plants almost invariably turn out to be males.

### Planting.

Seeds are planted in boxes or seed-beds under partial shade in early spring, and the young plants are put out when from 8 to 12 inches high, the foliage, except the young undeveloped crowns, being removed, allowing part of the petiole or leaf stalk to remain. Where plants are grown subject to the influences of shade, this should be removed several days prior to transplanting, also water should be withheld, but applied liberally just prior to removing, so that the roots may be mutilated as little as possible. In addition to fertility and good drainage, a soil containing a liberal proportion of humus favours development. No applications of fertilisers to light soils can maintain equal results. Liability or otherwise to frost should be considered in respect to location, for there are few cultivated plants more susceptible to frost injury than the Papaw. In planting the possibility of numerous male plants is present. The effect to a great extent may be minimised by including in place of one plant two in close proximity, and subsequently removing one when the sex is determinable. If both are males they should be discarded, male trees being entirely superfluous. Six feet apart has been given as a reasonable distance for planting, but to this at least 2 feet can be added, with 9 or 10 feet between rows to allow for reasonable development and room for the necessary cultural operations.

Fertility being absolutely necessary, applications of fertilisers should be made in accordance with directions contained in the pamphlet "Complete Fertilisers for Farm and Orchard," issued by the Department of Agriculture and Stock, and obtainable on application to the Under Secretary, Brisbane.

### Diseases and Pests Affecting the Plant.

Under fair conditions the Papaw is reasonably free from disease; fungus in Southern districts is sometimes evident on the fruit by discoloured areas of varying extent, causing decay in their vicinity and occasionally affecting the whole fruit. This is preventable by the application of Bordeaux mixture or Bordeaux powder. In some seasons the larva of a moth is persistent in its attacks upon the stem, which it usually enters close to the leaf bases, and may completely destroy the tree; against this it is questionable whether treatment is warranted. Red Spider amongst the young foliage and nematodes on roots are to a great extent attributable to placing plants in

unsuitable soils, particularly those of a light sandy nature, though weather conditions adverse to growth are congenial to both pests. Dusting with fine sulphur will have some influence against the former, but remedial measures cannot be profitably applied against the latter.

Being a comparatively shallow rooter, weed growth should be eliminated from plantations and cultivation confined to a shallow depth, varying slightly according to the nature of the soil, 3 to 4 inches being quite sufficient in that of a close texture.

### Marketing.

For marketing, sufficient care must be exercised so that the fruit is not bruised when handling, and packing is preferable in shallow trays or cases, so that there will not be undue pressure of fruit. Just at what stage of development the fruit should be gathered will vary according to distance from market and transport facilities, but the nearer the fruit approaches maturity at the time of taking from the tree the more pronounced will be its flavour, and when the market is readily accessible colouring should be evidenced at its apex.

In addition to its place as a dessert and entering into the composition of various condiments, the flesh of moderately mature fruit may by cutting into strips be satisfactorily dried by exposure. It is unlikely that the dried fruit will find a market where fresh supplies are available. The green fruit is utilised as a vegetable, treated and served in the same manner as a vegetable marrow.

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## THE FARM TRACTOR.

### LUBRICATION—CRANKCASE DILUTION.

With the many improvements which have lately been effected in tractor engines, crankcase dilution is not being experienced in the average late model tractor to the extent it was in previous years. It is, nevertheless, an ever-present cause of worry, and is responsible for a very high percentage of the repair bills which have to be met for worn engines.

In the motor-car engine only a very small percentage of crankcase dilution occurs, on account of the fact that the spirit used for power purposes is highly volatile and vapourises very readily, with the result that very little of it finds its way past the piston rings into the crankcase.

In the tractor where the internal combustion motor is using kerosene as a fuel, however, a certain percentage of crankcase dilution must occur on account of the fact that, when the piston draws in a cylinderful of gas, the gas comes into contact with the cylinder wall, which is comparatively cool, and some of it condenses in small globules of liquid kerosene, which is absorbed by the oil on the cylinder wall, and therefrom works its way into the crankcase.

The tractor driver himself can do much to obviate the causes of trouble. It is a fact that a careless driver will increase the percentage of dilution considerably by—

(1) Switching over to kerosene before the engine is sufficiently warm. The result of this is that the kerosene being drawn in does not vapourise, and consequently does not burn completely.

(2) Running the motor too cold. The most efficient working temperature for a tractor burning kerosene is 200 deg., or almost boiling. Mechanical faults such as poor ignition, incorrect carburetter mixture, worn piston rings, &c., all result in an excess of unburnt kerosene getting into the oil.

Naturally, the percentage of crankcase dilution is also governed to a very marked degree by the quality of the kerosene which is used in the engine. If the fuel is too heavy complete vaporisation does not take place, and these unvaporised fractions get down between piston and cylinder wall and heavily dilute the oil in the crankcase. Kerosene is not a lubricant, and crankcase oil which has a content of kerosene loses the major portion of its lubricating value. It is interesting to note that the new "Cross" kerosene just placed on this market by the Shell Company is remarkable for its property of complete combustion wherein an absolute minimum of crankcase dilution is assured. Only in a kerosene specially prepared to meet all conditions of tractor operation is this very desirable feature to be found.

# FOOD FLAVOURS IN CREAM.

By CHAS. McGRATH, Chief Supervisor of Dairying.

TO increase the consumption of dairy products it is necessary that all engaged in the industry shall take such action as will ensure a supply of dairy products of a quality that will attract the favourable attention of consumers. A food product in order to maintain a favoured place in competition must appeal to the taste, and there is no food more subject to off flavours and odours than milk and its products.

## Causes of Undesirable Odours.

Undesirable flavours and odours in milk and milk products are attributable to one or more of the following causes:—Abnormal physical condition of the animal, feeding highly flavoured foods, absorption of odours by the milk, and changes due to biological changes in the milk and its products.

The defects due to the two first-mentioned causes are noticeable immediately after milking, and are to a great extent under the control of the dairy farmer.

Odours absorbed by the milk include such as arise from tainted air in the milking shed, separator room, cream room, from coming in contact with gas and oil fumes, and odours arising from other sources of contamination. Biological changes in milk and its products are controlled to a great extent by care in production, handling, prompt cooling, and modern sanitary methods of manufacture.

Pronounced food flavour in dairy products is chiefly attributable to the cows consuming highly flavoured feeds which are mixed with our native pasture, introduced grasses, chiefly on scrub soils, and in fodder crops.

## Growing of Fodder Crops Essential.

The growing of fodder crops is essential in the economics of dairy farming and the production of milk and cream free from strong fodder odours and flavours is difficult in many localities under varying seasonal conditions.

The elimination of food odours and flavours has received the close attention of many research workers, who found that for the most part this kind of undesirable odour and flavour comes through the body of the cow, being transmitted through the stomach and lung walls direct to the blood, then through the mammary glands to the milk.

Grading officers are familiar with the strong odours and flavours in milk attributable to the feeding of highly flavoured foods such as green lucerne, silage, turnips, rape, rank pasturage, also the animals eating small quantities of certain weeds and shrubs. It is found that if the milk is drawn from the cow within one to two hours after she has eaten some varieties of high-flavoured feeds the milk will carry the strong food flavour, and if drawn subsequent to such period it may be comparatively free from food flavour.

The odour and flavour imparted by some varieties of high-flavoured weeds and fodders will impregnate the milk drawn three to six hours subsequent to being consumed.

Cream, the product of healthy cows grazed on weed-infested pastures or fed strong-flavoured foods produced and handled under approved conditions, will, on account of its strong flavour, be classed below first grade at the factory.

## The Possibility of Elimination of Odours.

An important matter for consideration is the processing of cream so as to eliminate the undesirable food flavour and odour.

We realise that the highest quality of butter will be produced from choice cream, and that any improvement in the general quality of cream will come from a keen appreciation on the part of the producer of the importance of care in production and handling, rapid cooling, and frequency of delivery at the factory. The problem of preventing or overcoming the food flavour and odour defect in cream is difficult of solution.

The elimination of undesirable weeds from pastures and cultivated plots on which the dairy cows are grazed is a matter that offers many difficulties owing to the conditions under which the industry is carried on.

Pasteurisation of cream for butter-making has a decided commercial and economic value by improving the flavour and storing qualities of the butter.

One of the many beneficial effects of the process is the elimination of certain strong food flavours, volatile and volatilisable flavours and odours being diminished or eliminated in the process of heating, cooling, and aeration.

The successful heating of the large quantities of cream of varying acidity to pasteurising temperatures is an art and science more complex and more difficult than the pasteurisation of market milk.

Any method of processing to be successful must be carried out without injury to the butter fat, which is very sensitive to other agencies than micro-organisms.

The fat in sweet fresh cream is not injuriously affected by temperatures high enough to sterilise it. The treatment of cream delivered at the butter factories in a sour condition presents an entirely different problem.

The combination of high acid and heat constitutes a powerful corrosive or oxidising agent and, by inviting oxidation of the less stable components of the butter fat, particularly the olein, gives rise to oily and metallic flavours and lowers the storing qualities of the product.

The elimination of food flavours from cream has received the attention of research workers in the dairy industry for some years, and as a result of their investigations a method of deodorisation has been introduced. A deodorising unit combines the processes of pasteurisation and aeration of the cream, and may be used solely as a batch pasteuriser.

Under the process the cream is heated and aerated in a partial vacuum so as to prevent oxidation of the butter fat, which is liable to take place when cream is exposed to high temperatures at atmospheric pressure.

## Acid Reduction.

Before submitting the cream to high temperatures excess acid must be removed. The process of acid reduction of the cream must be carefully carried out in order to obtain satisfactory results.

In butter factories with large outputs a deodorising unit would be used in conjunction with a flash pasteuriser, the cream passing from the pasteuriser to the deodoriser.

The deodorising unit is a vacuum pan constructed of glass enamelled steel. The heated cream is passed from the flash pasteuriser into the deodoriser when the gauge shows a reading of 18 to 20 inches of vacuum. As the heated cream passes through a spray device into the vacuum pan it forms into a fine mist, which facilitates the removal of the off flavour and odour. The temperature of the cream delivered into the deodoriser should be approximately 145 deg. Fahr., at which temperature it should be held during the processing.

This treatment, however, is not sufficient to remove strong off flavours and odours, and the cream is treated with large volumes of heated air (temperature, 160 deg. Fahr.) under a vacuum of 7 to 10 inches.

During the processing the cream is circulated from the bottom back over the distributing pan at the top of the deodoriser, the circulating cream being held between 140-145 deg. Fahr.

Samples of cream are taken from the deodoriser at intervals in the processing, and when the removable off flavours and odours have been eliminated the processing is completed.

It is necessary to stress the point that only volatile and volatilisable flavours such as green lucerne, silage, rank pastures, and a variety of feed flavours and minor taints are eliminated by the process. Flavours that are not volatilisable may be somewhat reduced, but are not eliminated by processing. They may be classed as follows:—Metallic, cheesy, bitter, rancid, and fermented cream.

By careful grading of the cream material benefits are obtained by deodorisation, as the treatment is effective in removing volatile and volatilisable flavours and odours.

Experiments carried out over two seasons have given favourable results from deodorisation when the cream was carefully graded.

The improvement in the flavour of the product of the pasteurised and deodorised cream varies from 1 to 1½ points higher than the product of the pasteurised but undeodorised portion of the cream.

# BERKSHIRE PIGS.

## A BRITISH BREED—ITS ORIGIN.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

OF the several breeds of pigs suited to the climatic conditions and the environment of Queensland, none appear to be so popular or so widely distributed as the Old English Berkshire, also occasionally referred to now as the Improved Berkshire and more frequently and correctly as the Berkshire. The type was named after the county in England in which it was originally developed and bred, and is considered to be the oldest of the improved British breeds of pigs. By the term "improved" it is intended to indicate that the breed has been built up and improved upon as a result of an admixture of breeds, inbreeding, selection, and gradual grading up from a mixed type to one recognised for more than a century as a pure breed that can be depended upon to reproduce its type faithfully and regularly, under almost any normal farm condition.

### Historical Record.

Historical records tracing away back to the year 1820 indicate that among the early fanciers of this class of pigs was one, Lord Barrington, who did much to improve the type, which at that time was of a very much heavier and coarser build than is common nowadays. In colour these older types were variable; some were white, some were quite black, while some were black and white with a patch of white on the shoulder; some were reddish, some rough-coated, others fine, and they were not noted for early maturity or prolificacy as we understand such terms in these days.

Herbert Humphrey was a very successful breeder of Berkshires in 1862, the year when the breed was first given a special class at live stock shows. He was the chief mover in establishing the parent body, the British Berkshire Society; for over twenty years he compiled the Herd Book and edited its proceedings. Since then breed societies, like the show yard, have exercised a stronger influence on type and quality than any other activity.

The British Berkshire Society has now amalgamated with the National Pig Breeders' Association of England (The N.P.B.A.) and pedigrees are included in the Herd Books which that association publish. In Australia the interests of Berkshire breeders are cared for by the Australian Stud Pig Breeders' Society (formerly the Berkshire and Yorkshire Society of Australasia).

### The Popularity of the Berkshire.

Berkshires, the world over, appear to have attained a standard of popularity not excelled by any other breed, though breed competition is exceedingly keen and there are many aspirants in the bid for popular favour.

The breed certainly had an advantage in being one of the first of the British breeds to be popularised, its dual purpose nature and adaptability have also been advantages and will continue to stand to the breed against competition from any other medium or large breed of similar type. They appear to be adapted not only to the cooler climatic conditions prevailing in England, Europe, and America, but to the warmer climes of Africa, the islands of the Pacific and to Australia and New Zealand, while they acclimatise readily and become adapted to conditions in almost any part of the world. Coupled with this popular favour the breed possesses a ready aptitude to mature either as porkers or baconers, and can be utilised to advantage as porkers at around 4 to 4½ months of age and as baconers at less than six months of age. It costs a good deal more to feed them after they scale 130 lb. dressed, and the bacon curers class them in a lower grade if too coarse and heavy.

### Their Early Development.

It is recognised of course that Chinese, Neapolitan, and perhaps also Siamese pigs were used for mating with the old English wild pig to form a foundation of the new type, while doubtless the prolificacy of the Old Chinese type (this breed was white in colour) has been handed down through the various stages of improvement. The older types of Berkshire, as illustrated in a very old oil painting in possession of the Agricultural Department of the University of Edinburgh, shows the breed as of a chestnut colour with dark patches through the hair; russet coloured spots were also common, and these still appear in Berkshires that show a tendency to degenerate, the reddish tinge in colour coming out very strongly in second and third crosses of improperly marked stock.

PLATE 118 (Fig. 1).

Berkshire Boar "Leadenham Duke" B. 748. Winner of the "Eaton" Challenge Cup for the best Berkshire pig exhibited at the Royal Agricultural Society's Show, Newport (England), 1927. Bred by Captain J. S. Reeve. Exhibited by Mr. J. D. Player. Note comely, attractive appearance, masculine sturdy type, great length and depth of body, colour markings, strength of legs. A type of Berkshire popular with British and Australian, and with many overseas breeders. Photo. by "Farmer and Stockbreeder," published in Vol. 44, National Pig Breeders' Association Herd Book.

In America they still have a "red" Berkshire, a type evidently evolved from this Old English russet-coloured strain, with, possibly, additional Tamworth crosses. The journal called the "Complete Grazier," in an issue in 1845, describes the breed after it had been materially improved from the standard of earlier days, as in colour, reddish-brown, with brown or black spots, sides very broad, legs flat, ears large and pendulous over the eyes, body thick, close and well made.

### The Modern Type.

In a report published a year or two ago by the British Berkshire Society it was stated the chief characteristics of the modern Berkshire are their hardiness, active disposition, general conformation, and their evenly developed carcase; the article adds that the breed is unsurpassed as grazers and foragers. As a result of their strong digestive and assimilative powers their increase in weight is large in proportion to the amount of food consumed.

The average quality of Berkshire pork and bacon is such that if properly fed and handled from birth the carcase can be graded as extra prime. The fat and lean should be evenly intermixed and of excellent texture, while the pigs should dress out well in proportion to their live weight. The roomy lengthy framed Berkshire with a medium type head and a fine coat of hair is much sought after; these are noted for early maturity, quick growth and for prolificacy, three very desirable characteristics in any breed of pig.

### Show Yard Influences.

There can be no denying the fact that the Berkshire has undergone more changes in type under the influence of the show yard in recent years than any other breed of pig which has been recognised in prize schedules for an equal length of time. There never was a time when quality and correct type were more keenly sought after and obtained by the breeder than now, for there is no call at all nowadays for the longer nosed, rough coated, coarse type of years ago.

Be it understood, too, it is no easy job breeding the correct type, nor is it an easy matter securing well marked pigs, as markings are. In fact it is doubtful if there is any other type in which it is so difficult to secure the ideal set out in the Herd Book standards as in the Berkshire; hence really well marked, typical animals, guaranteed breeders, and of an early maturing, prepotent type are always worth breeding. Fortunate is the breeder who has such types and who can perpetuate all these good qualities in his herd of pigs.

### Colour Markings.

From the layman's point of view, it is a debateable point whether it really pays to stick to the Herd Book standards of colour markings seeing they are so difficult to reproduce, and that they are of no value whatever from a pork butchers' or bacon curers' point of view. Breeders of other types of live stock have had to face the same difficulties, and in many instances have had to give way and resort to broken coloured animals in order to retain other valuable characteristics, like conformation, prolificacy, and early maturity. Breeders of Clydesdale horses, for instance, have had to depend on many occasions on sires that carried broken (or even to the layman indifferent) markings; breeders of Jersey cattle years ago would not have dreamed of using the broken coloured animals one notices nowadays in the show ring, yet it would not be correct to say that broken coloured animals are any the less valuable in the herd than the whole coloured stock so popular in days gone by. Berkshire breeders and those responsible for the preparation of the Herd Book standard have, however, not thus far given away on this important point, hence colour markings are still required to be as per the standard published in the concluding paragraph of this article.

These matters are well worth discussion at meetings of breeders interested in the stud pig business, for they are important, and may or may not have far-reaching effects on the future breeding of this class of pig. Suffice it to say, the animal must have a colour acceptable to the breeders of the type, and at present broken coloured pigs, those with patches of white in the ear, with one or more black feet, with a black tail or with white on any other portion of the body than those allowed for, will not realise top values except they are otherwise of exceptional merit, and really worth the money. Nor is it likely the broken coloured sorts will win in competition with better marked animals at any of the more important shows where Herd Book standards are accepted. The call is for well marked and well developed sorts, and without these qualifications stud values cannot be expected.

PLATE 119 (Fig. 2).

Berkshire Sow, "Whitley Ella's Beauty" S.5593. Winner of the "Eaton" Challenge Cup for the best Berkshire pig exhibited at the Royal Agricultural Society's Show, Nottingham, England, 1928. Bred and exhibited by Reading Corporation. Note difference in type and appearance to the Canadian Berkshire in Fig. 3, this indicating the wide range in type preferred by breeders in different parts of the world. The Canadian type has not yet been introduced into Queensland, where British types are predominant. Photo., "Farmer and Stockbreeder," published in Vol. 45, National Pig Breeders' Association Herd Book.

**Breed Characteristics.**

Prominent amongst characteristics claimed for the Berkshire breed by breeders of this type might be mentioned—

(1) Great muscular power and vitality which renders them less liable to disease. The boars are prepotent to a degree; the sows are fairly prolific.

(2) Activity combined with strong digestive and assimilative powers; hence Berkshires return a maximum of flesh and fat from the food they consume. They are good doers but need very careful handling, otherwise they become over-fat, and this in turn may lead to sterility and barrenness, and to unsatisfactory growth.

(3) The sows are reasonably good nurses and good sucklers if in medium breeding condition. They possess good limbs and good quality flat bone. Care should, however, be taken to avoid weak-legged pigs when selecting, for some strains have inbent knees and "cow" hocks and are down on the pasterns.

(4) The young pigs are strong, smart, and active at birth, consequently are well able to look after themselves if carefully handled.

(5) Berkshire can be fattened for market at any time, whilst they can be fed to any reasonable weight required.

(6) The flesh provides a high quality pork and bacon much sought after by pork butchers and bacon curers. Australian experience proves that the Berkshire for this purpose is ideal when crossed for pork with the Middle Yorkshire or a similar type and with the Tamworth or other large breeds for bacon. Some breeders also favour the use of Berkshire boars with first cross Tamworth-Berkshire sows, these latter sows having proved their adaptability and usefulness for farm purposes here. There are many instances where these grade pigs would be even a better proposition than the purebred Berkshires for pork and bacon production.

(7) The Berkshire boar possesses remarkable powers in transmitting the valuable qualities of the breed to his progeny, both in the purebred form and when used as a cross. This power is referred to as "prepotency," and is a very desirable quality. No breed has been used more extensively for cross breeding purposes than the Berkshire, nor has any been found to be more useful in refining the progeny of coarser types.

(8) Berkshires possess unsurpassed uniformity in quality and type; they reproduce themselves faithfully; their reasonable size, quick growth and easy feeding powers with uniformity and hardiness make them a favourite with breeders of pigs generally. Special care is necessary in the selection of breeding stock to ensure securing animals from well marked reliable strains; these are worth more money than those strains not noted for trueness to colour markings, &c.

(9) When slaughtered Berkshire flesh has a fine texture with a good proportion of fat and lean. The meat is sweet and of good flavour, this the result of quick growth and early maturity. Avoid overfat meat or stock.

(10) Both boars and sows have an excellent disposition; they are quiet, docile, and contented, and it is uncommon to find a bad-tempered fence-breaker amongst them; if one is found there should be no delay in immediately culling him or her from the herd. Cull out all unsatisfactory sorts without reference at all to breeding or purchase price. It does not pay to keep or feed inferior stock.

(11) Under normal farm conditions Berkshires are reasonably prolific and this characteristic can be distinctly improved by careful selection and breeding. In and in breeding, breeding too closely, and neglect soon tell their tale in reduced and irregular breeding powers; this also lowers the standard of quality and causes animals to be classed as "slow growers."

(12) Both fine and thick-haired types do well. The former or a medium type is the more popular; the thick, coarse haired types of years ago are not common or desirable now, for they are not as attractive or symmetrical as the medium coated (often referred to as the improved) types.

Berkshires are medium in size, trim in appearance and free from roughness—coarse wrinkly types should be ruthlessly discarded as breeders. They are well modelled and possess—in specially selected strains—the very necessary length and depth of body and hams. Short dumpy types are undesirable. The face is short and dished; the ears erect and slightly pointed; the hair glossy, soft and fine. Swirls, roses, and cowlicks in the hair along the back or rump are distinctly objectionable as these are regarded as definite faults in the show yards. To the pig fancier the well-bred Berkshire has a captivating and symmetrical outline.

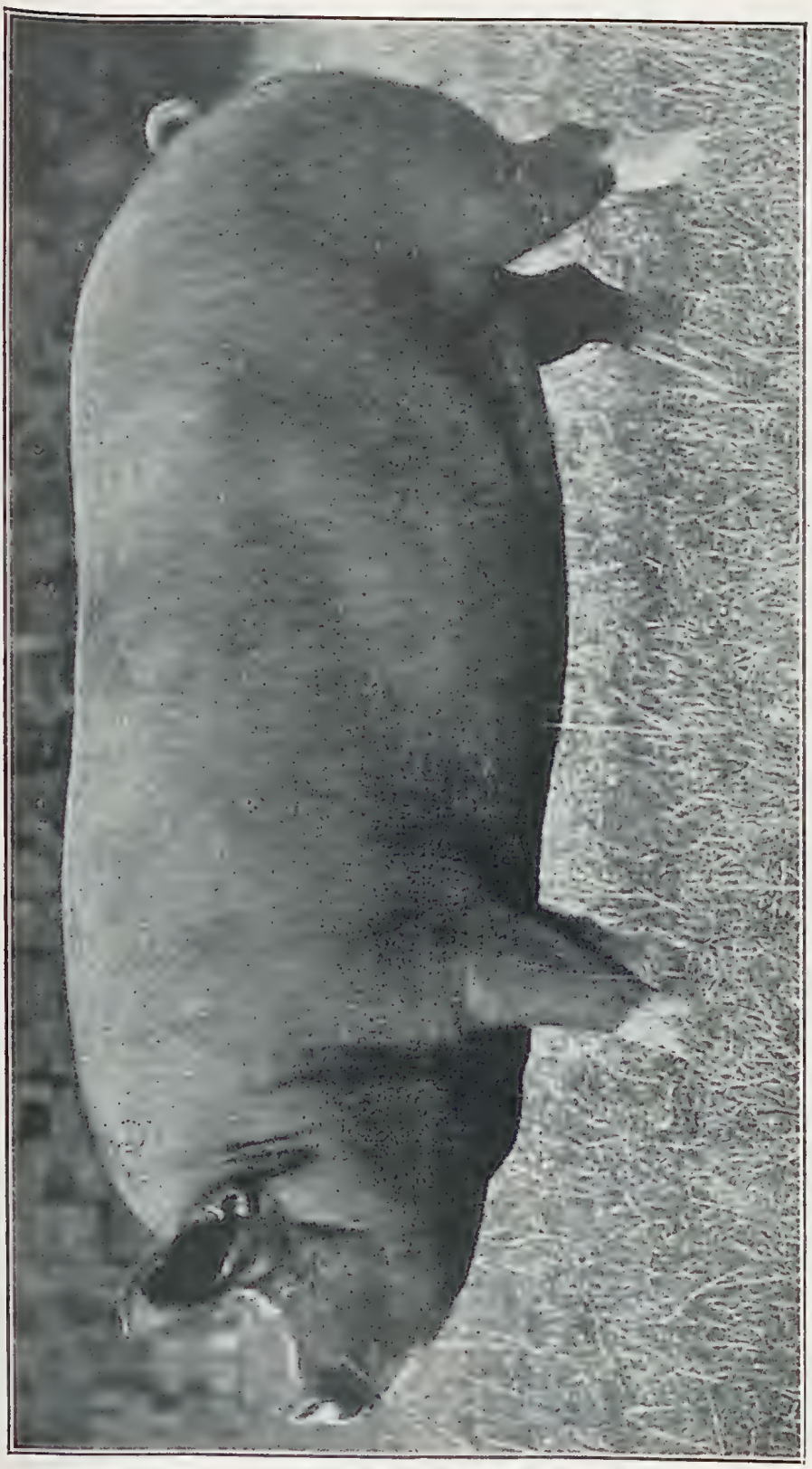

PLATE 120 (Fig. 3).

Berkshire Sow, "Woodburn Laurel," imported from Canada. Royal Champion Berkshire Sow, Palmerston North, New Zealand, 1928, owned by Mr. J. A. Russell, Gillespie's Line, Palmerston North, New Zealand. A type of sow popular with Canadian and Dominion breeders on account of great length and depth of body, well developed hams, and fine quality of skin and hair. Note striking contrast to British types. Photo. courtesy New Zealand Pig Breeders' Association, Inc. Published also in the New Zealand Herd Book, Vol. 40, 1928.

### Some Objectionable Features.

As with all other breeds some strains of Berkshires and some individual animals have undesirable features. A few of these noted over a long experience in the judging of pigs are as follows:—

*Legs and Feet.*—Weak, inbent forelegs, flat feet, weak pasterns and cow hocks. A pig with weak legs and feet is a very poor proposition and should be culled and sent to the butcher as soon as it is possible to put the animal in marketable condition.

*Head.*—Crooked jaws, tongue protruding from side of mouth, undershot or overshot top or bottom jaw, snout too long and crooked, ears lopped and too large. Eyes weak and with heavy overgrowing eyelids eventually causing blindness.

*Body.*—Heavy wrinkles behind the shoulder and along the side; weak loin and tucked-up flanks. Sows showing very poor development of and insufficient number of teats (less than twelve, evenly placed, prominent teats). The number considered most desirable is twelve to fourteen. Boars showing signs of rupture (hernia) in region of navel or in scrotal sac. Goose rump, drooping away towards low-set tail and weak tucked-up hams.

These, together with the tendency to carry too much condition and become lethargic or dopey, are all serious faults in any breed and should be avoided at all costs. No breed or no animal is perfect, and an inferior, badly marked Berkshire is no better than an inferior animal of other breeds. It pays to keep the best.

### Breed Societies.

Following on after the formation of the British Berkshire Society in 1845, the American Berkshire Association was organised in 1875 and the National Berkshire Record in 1893. It was during the year 1900 that the Berkshire and Yorkshire Society of Australasia was organised, and this society grew to such dimensions that in later years it became necessary to reorganise the parent body. This has now been completed, and the new organisation, styled "The Australian Stud Pig Breeders' Society," has headquarters in Melbourne, Victoria, and branches in the various States. The Queensland Branch Secretary is Miss J. Mackay, of Inns of Court, Adelaide street, Brisbane, from whom can be obtained a beautifully illustrated brochure entitled "Better Pigs on Every Farm," in which the organisation and development of the society is referred to.

These societies have done much for the Berkshire and for the other breeds registered in their herd books. Our own Society has been the means of organising the distribution of the various breeds to the four corners of the Commonwealth. To-day in Australia Berkshires stand at the head of the list as being the most readily adapted to any climate, soil or condition; they will reproduce with equal facility and quality both for pork and bacon.

### The Berkshire as a Breeder.

The Berkshire sow makes an excellent, contented mother—sturdy, vigorous, and thrifty, cleanly in habit (if given a chance to be so), fairly prolific, averaging from eight to ten per litter. The suckers when born are sturdy, lively, keen, and develop rapidly.

Sows should not be retained as breeders when over seven or eight years of age, as they lose their teeth and often become very clumsy and poor sucklers. They can, of course, be fattened and marketed as back-fatters if food is reasonably cheap and plentiful.

If the stock are too finely bred, however, they deteriorate and produce puny litters. The breed exercises a powerful influence in the production of good type pigs in country districts. Cross-breeding can thus, by the maintenance of pure, strong, prepotent types, be made of considerable local value.

### Berkshire Boars.

Some very high prices have been secured for Berkshire boars abroad. We have record of a genuine Canadian sale of the Berkshire boar, "Premier Longfellow," who was champion at the St. Louis State Fair in 1916, and at the sales realised £400. The record price in England is £500, whilst Berkshire sows have topped the sales on many occasions. Stud pigs have never realised these prices in Australia, but

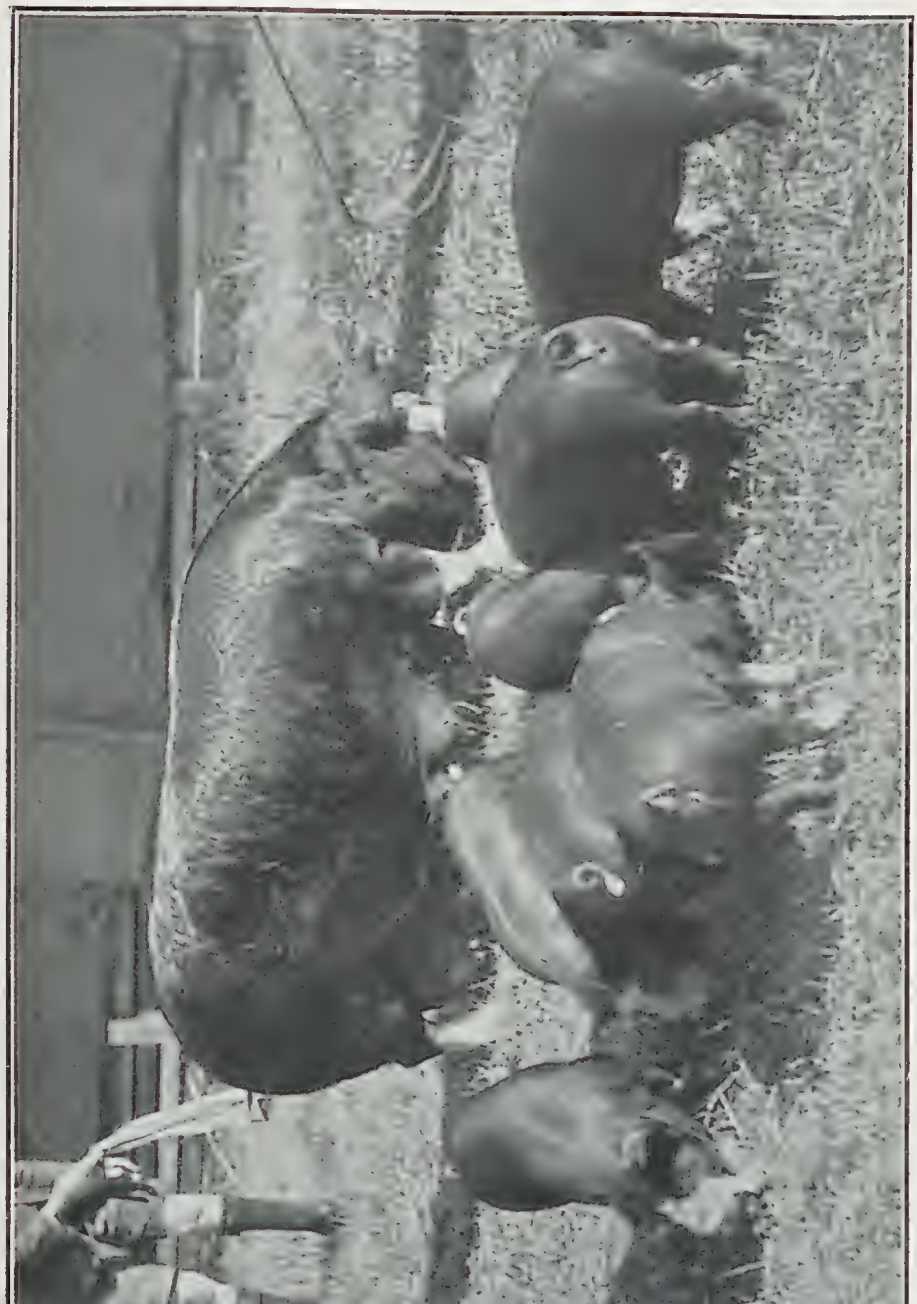

PLATE 121 (Fig. 4).

Champion Prize Winning Berkshire Sow, "Dundas Dora" 6628. Owned and exhibited by M. Porter and Sons, "Roselock," Wondai, Qld. The winner of many championships, and with litter, the winners of numerous prizes at Queensland shows in 1929. This type of sow, popular with Australian breeders, indicates the capacity of the Berkshire to reproduce itself faithfully, and to breed consistently. This sow's progeny have realised hundreds of pounds sterling, and though five years old she is still producing and rearing excellent litters.

from fifty to seventy-five guineas has been paid on several occasions in New South Wales and Victoria for selected animals.

A few years ago it was considered that the Berkshire was much superior to any other breed in prolificacy, but many breeders, taking advantage of the opportunities at auction sales of stud pigs in show rings, have followed a system of excessively fattening their animals. This has, in some instances, resulted in a loss of refinement and quality in the young stock, and a still more serious defect in the loss of hereditary prepotency.

It has been truly said that the "pig is what the breeder and feeder make it." The show yard winner of to-day is, unfortunately, often a short, chubby, unprofitable animal with an unnatural obesity, thick heavy forequarters, and poor breeding powers.

## Berkshires for Pork and Bacon.

In an interesting and informative pamphlet entitled "Berkshires for Pork and Bacon" issued a year or two ago under the auspices of the British Berkshire Society, the following records of the Berkshire breed appear. We make these excerpts for the benefit of breeders generally:—

(1) THE RECORD OF THE BERKSHIRE BREED.

After being cultivated with increasing carefulness by individual breeders for more than one hundred years, Berkshires were the earliest registered of any breed of pigs in England, and they have been consistently developed with strict reference to commercial requirements ever since. To this is due the wonderful record of the Berkshire breed—a record unrivalled in the history of British Live Stock.

(2) THE PERCENTAGE OF LIVE WEIGHT TO DEAD WEIGHT OF THE BERKSHIRE BREED.

The following table, compiled at the Cambridge University for the "Journal of Agricultural Science," giving the comparative percentage of meat for pigs of different ages exhibited and slaughtered at Smithfield, shows the marked superiority of Berkshires over other breeds for both pork and bacon:—

| | Three Months. | Five Months. | Seven Months. |
|---|---|---|---|
| Berkshires .. .. | 77.0 .. | 78.7 .. | 81.1 |
| Middle Whites .. .. | 73.0 .. | 76.8 .. | 82.4 |
| Large Whites .. .. | 73.0 .. | 76.9 .. | 80.9 |
| Large Blacks .. .. | 72.9 .. | 73.9 .. | 79.7 |

It is to its superior fleshing capacity, combined with a higher proportion of lean to fat at the early age requisite for tender meat, that the pre-eminence of the Berkshire breed in the carcase classes is due, not only at Smithfield, but wherever they are shown in competition with other breeds.

(3) THE BERKSHIRE PIG ABROAD.

In the Argentine, Australia, and New Zealand—countries in which the commercial aspects of live stock breeding are alone of importance and where the most up-to-date methods are exclusively employed—Berkshires constitute two-thirds of the purebred pig population, which is a striking tribute to the suitability of the breed for all climates and conditions.

This fact assumes particular significance in the case of Australia and New Zealand, where bacon production is a large and growing industry.

In South Africa and Canada, they are second in order of popularity, and they thrive in increasing numbers in Japan, India, the Malay States, and Central Europe.

In the United States of America, Berkshires have long had their own breed society. At the International Live Stock Show at Chicago, held annually, Berkshires have sired thirty champions, and have won first prize in one or more classes nineteen out of twenty-one years—a record unequalled by any other breed.

Since the war the demand for Berkshires for export to all parts of the world has steadily increased.

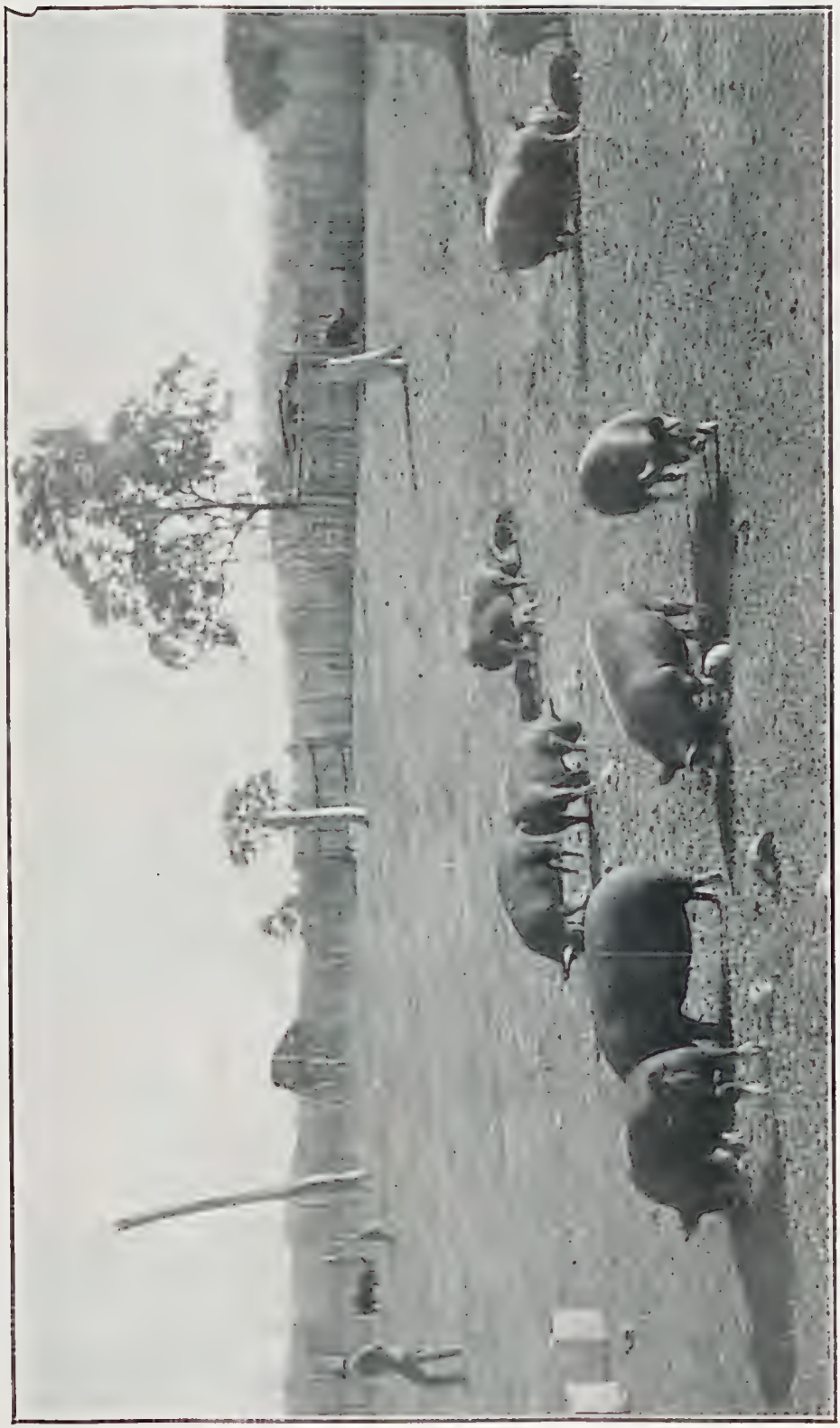

PLATE 122 (Fig. 5).

A group of Berkshires at the "Bon Vale" Stud, property of J. W. Handley, Murphy's Creek, Qld. Productive, prolific, and profitable.

(4) THE SUPERIORITY OF THE BERKSHIRE CROSS FOR BACON.

All independent experimental research for ascertaining the best cross for bacon shows that one or other parent—preferably the dam—should always be a Berkshire.

For Wiltshire bacon, which commands the highest price in the world, the Western Curers' Association in their leaflet, "Pigs for Bacon," say, "To produce at the greatest profit the best pigs for prime quality lean bacon the farmer is recommended to breed pigs from large white boars and pure Berkshire sows."

The experiments of the Canadian Government at Scott, Saskatchewan, which have been conducted under the supervision of a committee of curers, have reached the same conclusion—viz., that the large white boar on the Berkshire sow is a better cross for bacon than any other breed or cross.

## The Conformation of the Berkshire—"Standard of Excellence."

How closely the type to which the Berkshire has been bred corresponds with the requirements of the bacon curer may be seen by setting out in parallel columns the standard of excellence of the British Berkshire Society and the specification of the curers at a recent conference (in England), at the Ministry of Agriculture, called for the purpose of ascertaining their requirements.

| The Curer's Specification. | The Berkshire Standard of Excellence. |
|---|---|
| Back—Long and level, with ribs well sprung. | Long and level, with ribs well sprung. |
| Sides—Level and moderately deep. | Level and deep; free from wrinkles. |
| Hams—Broad, wide and deep to hock; tail set high. | Broad, wide and deep to hock; tail set high and fairly large. |
| Belly and Flank—Thick with straight underline. | Thick with straight underline. |
| Shoulders—Light, and on a line with forelegs below, and with sides laterally, free from wrinkles. | Light and aligned with forelegs below and with sides laterally, well sloped backwards, free from wrinkles and coarseness. |
| Flank—Aligned with sides. | Aligned with sides; should handle firm. |
| Head, Neck, and Jowl—Light. | Moderately short, face dished, snout broad, wide between the eyes and ears; ears fairly large, carried erect or slightly inclined forward and fringed with fine hair; jowl light; neck light, and evenly set on shoulders. |
| Legs—Short, and set wide apart; the pig should stand well up on the tips of the toes. | Short, straight, and strong, set wide apart, and hoofs nearly erect. |
| Bone—Fine. | Fine. |
| Flesh—Firm without excessive fat. | Firm, without excessive fat. |
| Skin—Free from coarseness and winkles. | Fine and free from wrinkles. |
| Hair—Fine. | Long, fine, and plentiful. |

## Some Interesting Litter Records.

The statement that "Berkshires do not farrow enough pigs," a statement that has often been made in Queensland and in the other States and abroad, has recently been challenged by the Berkshire breeders of America through their secretary, E. M. Christen, an authority on the breed, and an official who has done a great deal of research work over a long series of years.

When asked why this statement had been made, on the occasion of a chat to a prominent Berkshire breeder recently, the answer was short and not altogether satisfactory, for, said the breeder referred to, "I don't know, but that is what people tell me."

Observation had, however, taught Secretary Christen that these remarks were not true, because he had seen as many "producing" Berkshires as any other breed in the course of a five years' special study of the type. The ability of the Berkshire sow to produce a sufficient number of pigs was unquestioned in his mind. "Now," said he, "what was the evidence which could be presented to even a biased mind which would convince him that average Berkshire sows not only farrow as many pigs as any other breed, but they also rear as many."

So attention has been turned to the statistics as contained in the first 1,400 litters in volume 63 of the "American Berkshire Record." This survey brought the data strictly up to date, as the 1,400th litter was entered on the 2nd July, 1924. The record of 1,400 litters does not include duplicates such as litter mates. The 1,400 litters showed a total of 12,309 pigs farrowed, or an average of 8.792 pigs to the litter. This is as good or better than the other breeds do, and considerably better than averages on farms where purebreds only are used.

Of the 12,309 pigs farrowed in these 1,400 litters, 9,803 of them were reared. This makes an average of 7.002 pigs reared per litter, which is well within the probabilities of a net return from the brood sow even now.

When one considers that these litters were farrowed, and the records came from every State in the Union, from every age of sow, farrowed in every season of the year, and under every condition, we can accept them as authentic, and without hesitation. One of the tasks of Berkshire breeders is to see that this information passes into the hands of the men who do not know about the breed.

A Berkshire sow, or any sow to be profitable, must farrow a reasonable sized litter, and then rear them. It is true that many pigs are lost before weaning time because of carelessness of the owner, improper management, or wrong feeding. The sow is nearly always charged with the loss, whether it is her fault or not, especially by the sceptic who does not know, nor desires to find, the truth. Breeders must present facts to counteract this.

At the same time we must not bind ourselves to the fact that certain sows or certain families do not produce as large litters as others. When such an animal is found, the sow should be sold for pork. It is reasonable to expect the pigs in a small litter to be plumper and more attractive looking than those in litters of seven, eight, or ten. They ought to be, but there is no reason why they should be retained on the farm. The breeder must ask himself, and answer the question: "If the sow or boar in the big litter had had the same chance, would she or he be as good as the pig before us from a small litter."

This has not been done in the past, and our selection of breeders has been largely a selection without respect to breeding, ancestry, or the chance the pig has actually had. Many simply select the best looking pigs. This is shown by the fact that practically every pig in litters of three, four, or five, were all reared and (in the case of the American Herd Book referred to) were all registered, while it was seldom that more than four pigs were ever registered from a large litter.

It was also noticed that the litters in some herds ran uniformly large in size, while in others they were uniformly small. This goes to show that selection or care, or both, affect the number of pigs farrowed and reared.

A summary of the 1,400 litters mentioned above shows—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9 | litters | of | 3 | pigs | each | | |
| 19 | „ | 4 | „ | | | | |
| 46 | „ | 5 | „ | | | | |
| 99 | „ | 6 | „ | | | | |
| 177 | „ | 7 | „ | | | | |
| 282 | „ | 8 | „ | | | | |
| 294 | „ | 9 | „ | | | | |
| 215 | „ | 10 | „ | | | | |
| 130 | litters | of | 11 | pigs | each | | |
| 61 | „ | 12 | „ | | | | |
| 42 | „ | 13 | „ | | | | |
| 12 | „ | 14 | „ | | | | |
| 11 | „ | 15 | „ | | | | |
| 2 | „ | 16 | „ | | | | |
| 1 | „ | 17 | „ | | | | |

Total 1,400 with a total of 12,309 pigs farrowed and an average of 8.792 pigs to the litter.

In conclusion, we can say, and should say, that Berkshires are prolific, and use the above-quoted authentic figures to show it. Also, that these Berkshire sows are good mothers, as they reared over seven pigs to the litter, or, to be exact, 9,803 pigs to the 1,400 litters. These figures come without any omission, with no effort to find a favourable record, but as a clear, short presentation as to what an average Berkshire sow will do and can be expected to do.

The Federal Council of the Australian Stud Pig Breeders' Society has adopted the following "Standard of Excellence" for Berkshires, with points allotted:—

| | Points. |
|---|---|
| *Head and ears.*—Moderately short; face dished; snout broad and wide between the eyes; ears fairly large, carried erect or slightly inclined forward, and fringed with fine hair | 15 |
| *Neck and shoulders.*—Medium length, evenly set on shoulders; jowl full but not heavy; shoulders fine, sloping backward, and free from coarseness | 10 |
| *Back and sides.*—Back long and straight; loin full; ribs well sprung; sides deep and full to flank, showing straight underline; and in sows twelve good, evenly placed teats | 20 |
| *Hams.*—Wide and deep to hocks; tail set high on back line, and fairly large | 20 |
| *Legs and feet.*—Legs short, straight, and strong; feet set wide in line with shoulders; hoofs nearly erect | 15 |
| *Colour, skin, and hair.*—Black, with white on face, feet, and tip of tail; skin fine and free from wrinkles; hair long, fine and plentiful | 10 |
| *Character.*—A combination of all points showing distinctive breeding, type, and quality | 10 |
| Total | 100 |

## PIG HYGIENE.

By H. G. CHEESEMAN, Senior Slaughtering Inspector.

*From a paper read before the Pig Raisers' School at the Queensland Agricultural College, Gatton, June,* 1929.

Close association with meat inspection and piggeries for the past thirty years enables me to speak with some knowledge of the life and habit of the short-lived pig from its birth to its appearance on the table in various food forms. As we have all been taught, the pig belongs to the order mammalia, species pachydermata, or, otherwise, thick-skinned animal. Briefly, the generic characters of the domesticated animal are small head, ears short, thin, and sharp, neck full and broad, cheek full, flexible and short snout flattened in front, small and quick eyes, mouth small, strongly built body, uniform in line carrying a wealth of condition, short twisted tail well set, four toed, short legged, and full ham.

The wild pig has different characteristics, namely, long legs, long neck and snout, long narrow roach back, thin hams, carcass generally spare of flesh, eats ravenously, and develops big belly and lives on carrion offal.

According to design and nature the dentition of the pig varies considerably; at nine months he shows 40 teeth, and at eighteen months a full mouth of 44. In order, the teeth are divided into incisors or nippers, canine or eye-teeth, molars or grinders. Therefore, from the number and position of the teeth, physiologists are enabled to define their nature and functions, as they are always intimately related to the food and habit of the animal. They form, for the same reason, important guides to the naturalist in classification of animals. Thus the domestic pig can be classed as much a grinder as a biter, for he can as well live on vegetable as animal food, although a mixture of both is economically sound, which has been decided as the most natural.

From this description the pig may be regarded as a link between the herbivorous and carnivorous tribe, and is consequently known as an omnivorous quadruped; or, in other words, an animal capable of converting any kind of foodstuff into nutriment.

### Characteristics of the Pig.

Physiologists and naturalists are all agreed that the functional characteristics of the pig are the same in whatever part of the world he may be found—he is known for his gluttony and indifference to the character and quality of his food. Occasionally he shows an epicure's relish for a succulent root, pumpkin, or other vegetable. He will the next moment turn with equal gusto to some unsavoury offal, sour swill, or even liquid and stagnant filth from wallow holes in and about his lair, or, in other words, will endeavour to convert any kind of aliment, good or bad, into supposed nutriment. Hence, from its coarse and repulsive mode of feeding, slothful habits, laziness, and indulgence in sleep, he has gained for himself the unenviable name of being an unclean animal. The question arises "Why?" Well,

the answer is simply because the unfortunate animal is the victim of circumstances, brought about by the indifference of his keeper. Consequently, it is only reasonable to suppose that under such influence he is particularly susceptible to disease, saying nothing of other ailments of a dietetic nature, and which set up derangement of the alimentary canal.

Now, as filth defiles physically the characteristics of the flesh, or meat, it behoves those whose livelihood it is to depend upon pig-raising to consider the seriousness of violating the law of Nature, for it rests with man to counteract the evil consequences of some of his habits which the animal is unable to teach himself.

It is a remarkable fact that, though everyone who keeps a pig knows how prone he is to disease or other ailment which injures the quality and wholesomeness of the meat or flesh, yet very few have judgment to act on what they see and provide against it by strict attention to his diet, housing, and general welfare.

By strict attention to diet particularly is meant the thorough cooking or sterilising of all flesh food such as offals from slaughter-houses, skimmed and separated milk from dairies, butter and cheese factories, scraps of cooked animal substances, and boiled vegetables, bread and other aliment cast from banquets and possibly plates of sick and ailing individuals. The lastmentioned is most necessary, and the old adage "Prevention is better than cure" always stands good, for it is known, for instance, that the pig is most susceptible to tuberculosis. We also know that there are many individuals in our midst suffering from that dread disease, and experimentalists have shown the possibility of infection from human beings. In nearly every case the pig is infected by ingestion, thus it will be seen how easily he might become infected if care is not exercised in the systematic selection and proper boiling of all foodstuff.

## Tuberculosis in Pigs.

It is quite common knowledge that tuberculosis in the pig develops rapidly without showing any external symptoms. The disease can only be definitely detected upon slaughter. Anyway the disease is always the same from whatever cause. Though subject to disease, no domestic animal is more easily kept in health, cleanliness, and comfort. By comfort is meant that his sleeping quarters should be perfectly dry and well sheltered from all changes of the weather. He should have a nice cosy bed to burrow in; moreover, under cover in his sty, there should always be a trough full of clean drinking water. The trough should be so arranged as to prevent the animal from immersing his body or standing in it, or otherwise fouling it. Clean water is most essential to a pig, saying nothing of a shovelful or two of charcoal, some lime, brimstone, Epsom salts, or other medicinal agent, which are necessary to correct physical disorders caused by his artificial existence.

## The Pig's Economic Value.

As you all must know, habit blunts the sensibilities of most of us; and men are not naturally cruel. Still, I am a believer that there are some among us who never realise the fact that the brute beast can be made to suffer quite unnecessarily. What would happen if a pig had a voice to tell its sufferings and needs? I am afraid that many of us could not listen without feeling a twinge of conscience.

There is no domestic animal so profitable or so useful to mankind as the pig. Its value per pound exceeds that of all other flesh-giving animals.

## Meat Inspection.

Meat inspection is of great national importance to a meat-eating community such as we are in Australia, especially as our daily bill-of-fare is made up largely from the flesh of the ox, sheep, or pig. Therefore, it is only reasonable to expect that the great mass of consumers—the general public, for they are the most interested in the matter—should have some sort of guarantee that the flesh they do eat is perfectly free from disease.

Meat-eating people throughout the whole world recognise the necessity and importance of inspection of their meat and other food products.

## Diseases of the Pig.

Tuberculosis is commonly spoken of as "T.B.," technically it means "Tubercle Bacilli." We are told that tuberculosis is a specific bacterial disease, and above all the most widely distributed of all contagious diseases, saying nothing of its being the most universally dangerous and deadly to man and animal. Of the latter, swine, according to statistics, are first among its victims.

Speaking generally, I have endeavoured to show how easily a pig might become tuberculous when fed on material rich in tubercle bacilli. Apart from such mechanism of infection, a tuberculous sow may infect all its young when its teats are contaminated or otherwise infiltrated by tuberculous deposits. We are also told that infection by the respiratory tract is certainly possible, but rare owing to the fact that affected animals are usually slaughtered before the softening of the pulmonary lesions have time to disseminate the virulent matter.

The disease can only be definitely detected upon slaughter; that being so, the inspector has no difficulty in locating the presence of the disease, that is, as far as the naked eye is concerned.

More often the glands of the head are affected than the body, which accounts for the greater number condemned. Times out of number the question is raised, "Why condemn the head and not the body?" It may be explained this way. The pig mainly breathes through his mouth where straying germs of disease gain an entrance which are absorbed by the delicate membranes of the mouth, tongue, and tonsils, resulting in the fact that the glands draining the part act as fortresses against further invasion of the body. It then only remains a matter of time when they may be overcome by the enemy, thus the barrier being broken down the germ has a clear passage along the ducts into the next lymphatic vessels. It therefore will be understood that if only a speck of disease is found elsewhere in the carcass, it involves seizure of the whole body.

Often a recommendation of the Royal Commission on Tuberculosis in 1898 is cited, which reads: "In view of the greater tendency to generalisation of tuberculosis in the pig, we consider that the presence of tubercular deposits in any degree should involve seizure of the whole carcass and of organs."

This rule, of course, is not carried out in the case where the head is only affected.

Another feature of the disease, from an inspection point of view, lies in the fact that it is seldom met with in the flesh or bones of the pig, mainly confining itself to the lymphatics and delicate linings of the chest and abdominal cavity and organs. The glands, or kernels as they are commonly called, play an important part in meat inspection. It is from them the inspector gets the first indication of the presence of disease. The normal condition and colour of a gland is moderately small, somewhat firm, and on cutting exudes moisture (lymph) the colour of—in fact it resembles—common yellow soap.

The most accessible glands are the sub-maxillary and cervicals of the head and neck, dorsal (back), renal (loin), inguinal or mammeny, and the iliac. Of the visceral glandular organs, lungs, liver, and mesentery, &c., are all more or less subject to disease.

With regard to condemnation for parasitical infestations, very rarely is a pig totally condemned. The only parasite of any consequence is the kidney worm known as the "Stephanurus dentatus." Very little is known about it other than it is very destructive and will sooner or later cause economic losses if the pig farmer does not attend strictly to the laws of sanitation.

The worm itself varies in size, being a thick, round, and mottled specimen and is found abundantly in the kidney region and in other portions of the body. The presence of the worm gives rise to cysts and abscess formation containing pus-producing organisms and eggs of the parasite. They are also found in the ureter; from whence they pass out with the urine. Old sows and boars are very subject to the parasite, and no doubt are the cause of all the trouble in younger pigs. Pigs during life show no evidence of the infestation, unless they are old sows. From my experience the complaint is more pronounced in cold weather than hot.

The conditions which are most favourable for the infestation of the kidney worm are filthy wallows, insanitary feeding and watering places, especially where large numbers of pigs are kept year after year on a small area. Veterinarians tell us there is no reliable method of dealing with the trouble other than thorough sanitation. That being so, the pig farmer must then seriously consider the matter of changing his sties and yards every year or so to fresh ground, and planting a crop before using the piggery again for pigs. In any case, pig yards should be selected with a view to securing proper drainage, cleanliness, and sanitation. They must also be as free as possible from the common type of mud wallow, which soon becomes a reservoir of concentrated filth and bacteria.

In conclusion, I would plead for the pig's welfare and comfort, and again stress the fact that much disease and other disorders are due to insanitary feeding and unclean drinking troughs in which the pigs are able to place their feet which carry filth direct from the floor of the sty

# REARING AND FEEDING OF CHICKENS.

P. RUMBALL, Poultry Expert.

POSSIBLY the most important feature in poultry-keeping is the successful rearing of the young stock. To be profitable in after life, stock have to be well grown and correctly fed from infancy. Many conditions are necessary to obtain this class of stock, but given good sound breeding stock and good incubation, the rearing and feeding are the next essential points.

## Rearing.

If the chickens are hen-hatched, very little attention other than keeping them free from vermin, protecting them from predatory animals, and correct feeding are necessary, but when hatched by incubators artificial means of brooding have to be resorted to.

Artificial brooding of chickens is a difficult process with an inefficient plant. The aim is to supply heat or to keep chickens warm, and at the same time wean them from brooders as quickly as possible. No hard and fast rules can be laid down either for artificially-heated brooders or cold brooders. We have to govern our actions by the climatic conditions.

A good illustration of the requirements of brooding is given by the hen. She regulates the heat to the chicks under her care according to the age and weather conditions. If the chickens are young she moves about very little and sits fairly close, gradually increasing the amount of range as the chickens develop. On a cold wet day you will notice her collecting the chickens frequently and warming them up. It does not matter what type of brooder is used, young chickens should be confined to a very limited space until they learn where it is warm. The range can then gradually be increased, and the more outdoor life and healthy exercise they have the better.

## Temperature.

In artificially-heated brooders temperature is a very important factor. If insufficient heat is supplied the chicks crowd together. The correct heat is the only method by which this can be prevented. Over-heating is also to be avoided on account of its weakening effect and the difficulty that will be experienced in weaning from the brooders. The general comfort of the chickens is a sure index that the temperature is fairly satisfactory, and if the droppings are well scattered under the hover in the morning, it is proof that the chickens have been fairly comfortable. When the chickens are first put into the brooder, they come from a nursery in the incubator which generally has an average temperature of 90 deg., and it is as well to start your brooding at this temperature, gradually reducing it until heat can be dispensed with in from three to four weeks.

## Ventilation.

More chickens are lost annually due to the lack of ventilation than by any other cause. Brooders which are usually made to hold a 100 day-old chickens are generally too small for the same number of chickens a week old. It frequently happens also that the attendant makes no allowance for additional ventilation with the growth of the chickens, and although he has been successful in rearing them to the age of one week they then start crowding and dying. The lack of ventilation has a great weakening effect on both young and old stock. It causes the young to crowd, and renders the older birds more susceptible to disease. When chickens have crowded they present a wet appearance in the morning, to which the term of "sweating" is applied. Sweating is not the cause. The wetness is caused by the condensation of the moisture content of the breath which would have been carried away if proper ventilation had been provided. Chickens which have been overcrowded rarely recover from the ill effects, and it should be avoided at all costs.

In brooding under any system the following are the essential points:—

(1) Limited range, increasing with age.

(2) Sufficient heat, which should be reduced as early as possible.

(3) Ventilation, which should increase with age.

(4) Correct accommodation. What is just enough room for 100 day-old chickens rapidly becomes too little as they grow.

(5) Never attempt to brood chickens of mixed ages.

**The Colony Brooder.**

Where a large number of chickens are to be reared the colony brooder is the cheapest and possibly as effective as any other type. With this class of brooder several hundred chickens can be run together with little more trouble than would be required for a lot of 100 under most systems.

Five hundred chickens should, however, be the limit in any one colony brooder, but possibly 100 less would give slightly better results.

The colony brooder consists of a heater having a metal hover for the purpose of deflecting the heat. The fuel used in some cases is coke, while other makes are built for burning oil. Whatever type of colony brooder is to be used a special house is necessary. This house should measure approximately 14 ft. by 16 ft., and be at least 6 ft. high. The roof may be either a hip-roof or skillion. The building should be lined and ceiled and provided with ample light.

PLATE 123 (Fig. 1).—COLONY BROODER.

Note enclosure of wire netting restraining to some extent the liberty of very young chickens.

The house may be built with timber or iron. Iron is to be preferred, being of a more lasting nature, and at the same time it is not easily scaled by rats. The lining and ceiling should for preference be of ⅝-in. tongue and grooved pine, but for economy sake wheat sacks sewn together and whitewashed will serve. The floor should be concreted and the iron walls sunk into the ground to the depth of about 1 ft. This prevents rats burrowing under the floor, while the concrete floor is readily cleaned.

It is possible to make use of a less elaborate house for the operating of colony brooders, but it will readily be understood that a house not lined or ceiled will require a greater amount of heat to maintain the desired temperature, with the result of increasing the fuel consumption and attention to heaters.

**Cold Brooding.**

The term cold brooding is a misnomer. Under this system the heat of the body is retained by means of cloths or flannel and a restricted circulation of air. This method of brooding has been in operation for many years, but it is only recently that the practice has been adopted by commercial poultry breeders. The illustration of cold brooders will convey the nature of their construction. This cold brooder can be

operated in brooder-houses or rearing-pens of simple construction. They have given excellent results in Queensland, and are extensively used by a larg number of breeders.

### Placing Chickens in Brooders.

When chickens are to be placed in brooders from the incubators the floor should have a light dressing of dry soil to absorb any excreta and to give the chickens a good footing. A small amount of litter in the nature of chaff or short straw will provide exercise and tend to keep the chicks active, especially if some of the scratch grain is occasionally scattered among it. As previously stated, they should be confined somewhat until they learn where they can get warm, and after this encouraged to take as much exercise as possible by ranging either in specially erected runs or at liberty about the farm.

### Cleanliness.

Cleanliness in every operation is essential; insanitary conditions not only pollute the atmosphere of the brooders but are frequently the cause of serious epidemics of disease. Where brooders and brooder-houses are thoroughly cleaned vermin cause little or no trouble. Brooder-houses should be cleaned out at least twice weekly, while a daily cleaning of the actual sleeping quarters is recommended.

### Weaning.

When chickens are three to four weeks old it is generally necessary to remove them from the brooder-house to make room for younger ones. This is also necessary to protect the soil becoming contaminated by growing stock. Successful and correct brooding will materially assist these operations.

Colony-houses are possibly the most suitable for the housing of the chickens on leaving the brooder. These can be built on slides or wheels and moved about the fields or made fixtures. Under either conditions hurdles or netting-yard are necessary to confine the chickens until they become accustomed to their new quarters. After a week or ten days these hurdles can be removed, and, providing the rearing-houses are not too close, little or no trouble is experienced with chickens becoming mixed. The numbers put out together, of course, varies with the accommodation at your disposal, but larger flocks than 100 are not recommended, although cases are known where 300 were put out in one lot and no ill effects experienced. As the stock develop it is possible to cull out the cockerels. This leaves more room for your valuable growing pullets, and protects them from the attentions of the cockerels.

A good size rearing-house for 100 chickens is one 10 ft. long, 8 ft. deep, 6 ft. high in front, and 5 ft. at back, with a 3-in. space between the top of the back wall and roof to provide ventilation. The front should be open and netted in with a gate provided. This enables you to lock the house at night as a protection from predatory animals. A temporary curtain of bag covering half of the front will afford sufficient protection from winds, &c. When the chickens are first placed in this house they are too early to perch. Various arrangements can be made to protect them from crowding into the corner, but the writer has had the best results by bedding them down on baled straw. The straw needs to be fairly deep and loose, with the corners of the house well blocked. The chickens appear to be content to snuggle in the straw instead of making warmth by crowding together. It is then only necessary to go around in the evening with a fork and loosen the straw up, shawing the droppings through on to the floor, which can then be readily cleaned up.

Poultry are largely creatures of habit and can generally with care be trained to act as required. When once they form a habit—good or bad—it is difficult to alter. A little time spent in seeing that chickens go into the house of a night when first placed in a new yard or when they are first let out of the brooders into the netted runs will amply repay poultry-keepers by preventing losses through crowding.

### Feeding.

There is a good deal of difference of opinion on this subject. Foods and methods of feeding which answer well with certain lots of chickens, and where operations are on a small scale, are not always workable where hundreds of chickens are to be reared.

Your primary aim is good healthy growth. The speed with which a chicken grows is very rapid, and nothing must be done that will retard it. You cannot be overcautious in the feeding. Some animals can be neglected for a day and not experience

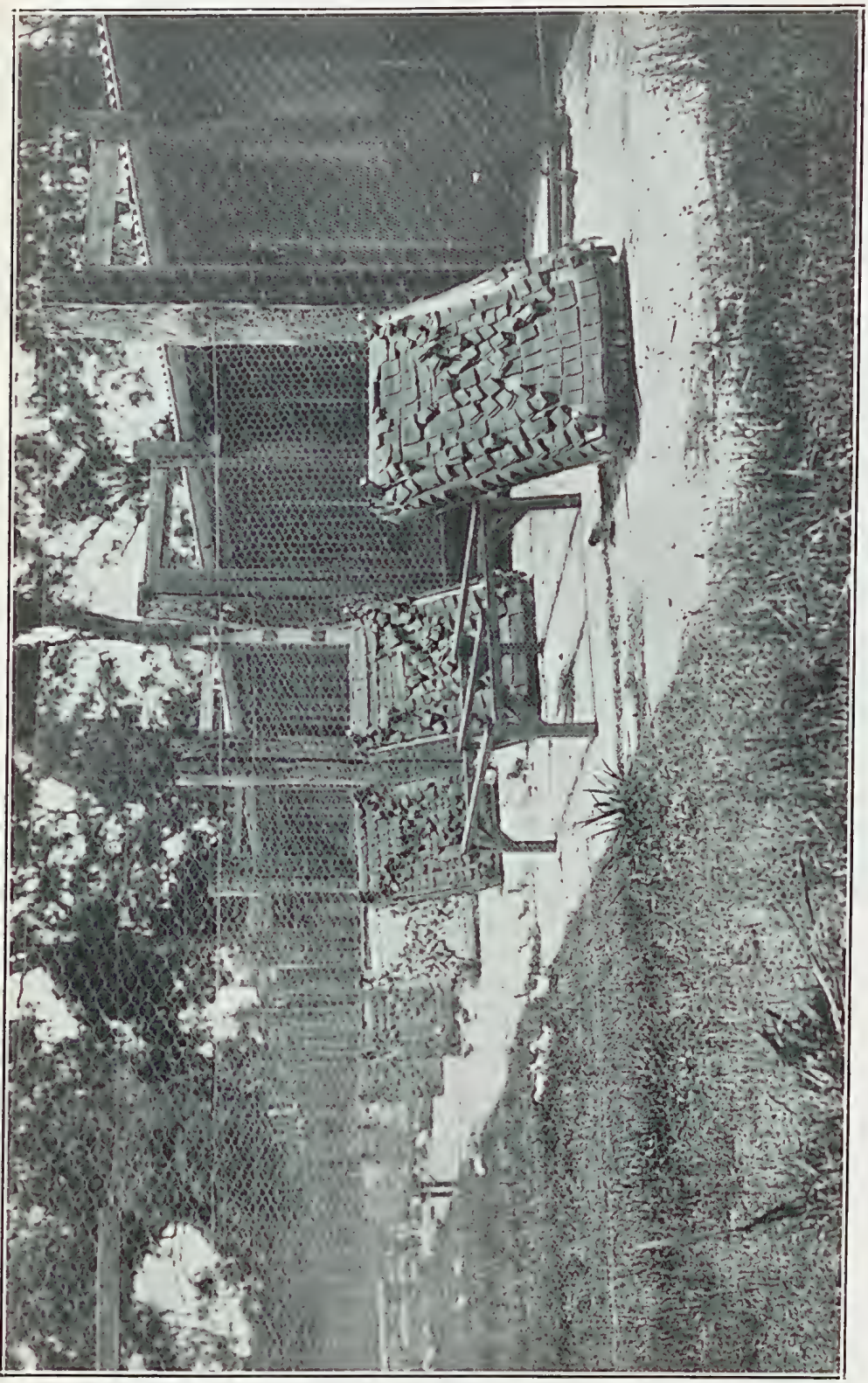

PLATE 124 (Fig. 2).—COLD BROODERS.

Showing numerous Cold Brooders being operated in a continuous house. Brooders taken from the house daily and placed in sun to air.

any ill effect, but a chicken is such a delicate piece of machinery that great care must be exercised always. When a chicken is born it weighs about 1½ oz., and in six months' time you want it to be a well-developed pullet of 4 lb. or more—that means that it has to make forty times its original weight in six months.

Chickens need no feed for at least forty-eight hours after incubation. Nature has provided for this period, as just prior to hatching the balance of the unabsorbed yolk is drawn into the abdomen, and under natural conditions this food supplies the chicken with its requirements until it has strengthened up. Feeding before this period sets up bowel trouble with the results of heavy mortality. Feeding should be done frequently—little and often is the best policy.

## Kinds of Foods.

In deciding upon the kinds of foods that are necessary for growing stock, it is desirable to have some idea of the constituents of the body of the animal, as they must all be derived from foods. Slight variations in composition exist, but there is always a certain approximation to the normal, full-grown animal.

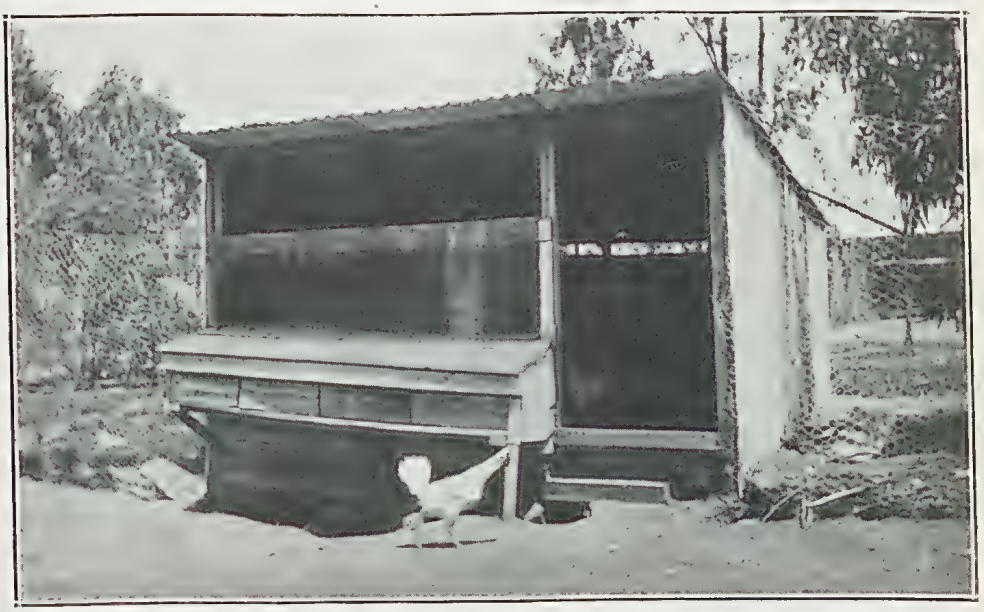

PLATE 125 (Fig. 3).—TYPE OF HOUSE SUITED FOR THE HOUSING OF CHICKENS AFTER LEAVING THE BROODERS.

Analyses made at the New York Experimental Station gave as an average of a Leghorn hen 55.8 per cent. water, 21.6 per cent. protein, 17 per cent. fat, and 3.8 per cent. ash. This is the composition of the whole of the body—bones, blood, feathers, and viscera.

The egg, which is potentially a chick, shows a striking resemblance in analyses to the body of a full-grown bird. Of the dry matter of the egg, apart from the shell, 49.8 per cent. is protein, 38.6 per cent. fat, and 3.5 per cent. ash.

It will be seen, therefore, that about half of the dry matter of the whole body is protein and about 8 per cent. ash. This suggests that slow growth would follow the use of foods which contain small amounts of nitrogenous and mineral matter.

Chickens at liberty consume large quantities of protein matter in the form of insect life, but it is not suggested that large quantities of meat-meal should be used. There are many excellent chick foods and growing mashes on the market, and it is questionable if it pays the individual to mix his own. Too many think it an unnecessary expense to purchase these foods, but, from remarks upon the necessity for the proper development of the stock and those upon the analyses of the bird, it is hoped that the necessity for the correct kinds of foods is demonstrated. Experience has

taught us that a balanced ration is necessary for the feeding of chickens as well as for the production of eggs, and that this balance can only be made by using a variety of foods.

When the chickens are first placed in the brooder they should have access to grit or coarse sand. They will eat a little of this, and it will then be in the gizzard ready to deal with the food to follow. Grit should always be in evidence in the pens of chickens, and should consist of quartz or hard shell grit and charcoal.

Drinking water can be supplied immediately on leaving the incubator. This needs to be kept clean and replenished at least twice daily. The inverted bottle and tin is the cheapest water container.

For two days feed rolled oats on a bag or board. The chicks soon learn to pick this up. After this a mixture can be made of good cracked grains, such as hulled oats, skinless barley, wheat, and maize. Some of this grain should be scattered on the litter and the chicks taught to work for their living. This exercise promotes health, develops the bird, and frequently assists in checking the vice of toe-picking. From about four days a dry mash can be fed, composed of one part bran and two parts pollard. For every 20 lb. of the mixture add 1 lb. of the buttermilk powder and 1 lb. bone-meal and 2 oz. of salt. In mixing the salt, do so with a small quantity of the food first, and then add this to the bulk. By doing this an even distribution is made.

*From 6 to 12 weeks.*—The buttermilk can be replaced by ½ lb. of meat-meal and ½ lb. of bone-meal. The grain could remain the same, only increased in size. This feeding can be continued until the chicks are twelve weeks of age.

*From the 12th week until laying.*—The grain can be increased in size until full-sized grain is consumed, and fed once a day. The mash can also be altered considerably by the use of lucerne meal. The mash then could be made of the following constituents:—Lucerne meal, 12 lb.; bran, 26 lb.; pollard, 56 lb.; meat-meal, 2 lb.; bone-meal, 4 lb.; salt to be added at the rate of 10 oz. to the 100 lb. of mash.

### Green Feed.

This is essential for the best results, and can be fed after a couple of days. Chickens in their natural state, at liberty, consume large quantities of the most tender growth of grass, &c. Lucerne chaff and lucerne meal are excellent substitutes for green feed, but they are not a suitable food for chickens until they are about at least three months of age. The most suitable green feeds are the tender-growths of barley, oats, &c. As the chicks grow they have rape, kale, or lucerne, but always feed it while tender and green.

### Milk Feeding.

On a farm there is frequently a surplus of skim milk which can be fed to chickens with advantage. Some intersting experiments were carried out at the College of Agriculture, West Virginia University, on feeding chickens, in which skim milk was used, and it was found that chickens fed on a ration where milk was used—

(1) Consumed more grain;
(2) Grew more rapidly;
(3) Laid earlier than chickens fed on similar foods without milk; and
(4) The mortality in the milk-fed chickens was not so heavy.

The milk may be fed in either a sweet or sour state. If sour, it is claimed by some authorities that it assists in preventing outbreaks of coccidiosis and white diarrhœa. Although dry mashes are recommended, small quantities of wet mash mixed with milk are very beneficial, and, where large quantities of milk are available, animal food in the form of meat-meal or buttermilk is not necessary.

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*THE MODERN FARMERS' NEED.*

A *Nutgrove (Cooyar Line) farmer writes (24th July, 1929):—"I wouldn't miss my Journal. . . . . Keep up the publication. It is one of the best and cheapest and contains the knowledge an up-to-date farmer needs."*

# General Notes.

## Staff Changes and Appointments.

It has been approved that Mr. W. D. Lewis be further seconded for duty as Temporary Inspector under and for the purposes of "*The Diseases in Plants Acts, 1916 to 1924*," as from 1st July, 1929, until 31st December, 1929.

Senior Sergeant W. O. Ingram now stationed at Cairns has been appointed an Inspector of Slaughter-houses as from 18th July, 1929.

The services of Mr. C. G. Munro, as Manager, State Farm, Home Hill, are to be continued until 30th June, 1930.

The services of Mr. J. H. Mitchell, Inspector under the Diseases in Plants Acts, are to be continued until 31st December, 1929.

Mr. A. E. Adcock, of Dalby, has been appointed an Acting Inspector of Stock as from the 1st August, 1929.

Acting Sergeant F. Conaty has been appointed an Inspector of Slaughter-houses as from the 17th August, 1929.

The following have been appointed Assistant Cane Testers for the forthcoming sugar season to be employed at the following mills:—Miss E. M. Mullin, Plane Creek; Mrs. M. E. Nally, Babinda; Miss T. M. Payne, Invicta; Miss A. Murray, Moreton; Mr. St. C. G. Fanning, Pioneer; and Mr. D. Walton, North Eton.

Messrs. W. J. Ross and H. J. Freeman have been appointed Senior Instructors in Fruit Culture, Fruit Branch, Department of Agriculture and Stock, and Messrs. H. Barnes, H. St. J. Pratt, S. E. Stephens, R. L. Prest and E. F. Duffy have been appointed Instructors in Fruit Culture, Department of Agriculture and Stock.

## Fruit Marketing Regulations.

Regulations under "*The Fruit Marketing Organisation Acts, 1923 to 1928*" have now been passed providing for the election of members of the Banana, Pineapple, Citrus, Deciduous and Other Fruits Sectional Group Committees, and also for the amendment of Form 5 which the secretary of every Local Association shall, when required by the Committee of Direction of Fruit Marketing, forward to the office of the Committee in Brisbane giving particulars of his roll of members. The Fruit Marketing Organisation Act Amendment Act of 1928 provides that a Sectional Group Committee shall not consist of more than ten members, and in accordance with this stipulation the new Committees shall consist of—

| | |
|---|---|
| Banana Sectional Group Committee .. .. .. | 10 members |
| Pineapple Sectional Group Committee .. .. | 10 members |
| Citrus Sectional Group Committee .. .. .. | 9 members |
| Deciduous Sectional Group Committee .. .. | 9 members |
| Other Fruits Sectional Group Committee .. .. | 8 members |

The Regulations state definitely the Local Associations and Groups of Local Associations which shall constitute an electorate and the number of members to be elected by each electorate.

## Diseases in Plants—New Proclamation.

Proclamation No. 4 under the Diseases in Plants Acts has now been rescinded and a new Proclamation been issued in lieu thereof. Under the old Proclamation, the introduction into Queensland of plants or portions of plants of all and every species of grape vine was absolutely prohibited, but the introduction of grapes from New South Wales and Victoria was permitted, provided the consignments were accompanied by certain certificates as set forth. The introduction into Queensland by sea from South Australia and Western Australia of grapes was also permitted.

The new Proclamation makes provision for the above, but in addition provides that grape cuttings from South Australia or Western Australia may be introduced for a period of eight weeks from the 15th August, 1929, on the condition that the cuttings are accompanied by a certificate from the Horticultural Instructor of South Australia or the Superintendent of Horticulture of Western Australia, as the case may be, setting out that the cuttings are entirely free from any disease of the grape vine and are from a district entirely free from Phylloxera. So far as is known, both South and Western Australia are free from Phylloxera, and have no diseases of the grape vine which do not already exist in Queensland.

### Man not a Robot.

"Modern educationists have to realise that in this mechanised life man is not a robot, but has a soul to put into his work," said Mr. C. Sydney Jones, High Sheriff of Lancashire, speaking recently on "Industry and Education." "One of the great duties of education to-day was to give vision to the people. However clever our mechanics might be, we should not be able to hold our own in the world unless we had that soul which only came from the intellect and the spirit."

### Close Season for Game.

An Order in Council has been made altering the Close Season for Goose and Duck in Queensland. In District No. 1 (Northern Queensland) the period of close season is from the 1st October in each year to the 30th April in the following year inclusive. In that portion of District No. 2 situated north of the 22nd parallel of south latitude (Central Queensland) the period of close season is from the 1st November in each year to the 31st May in the following year inclusive, while in that portion of District No. 2 south of the 22nd parallel of south latitude (Southern Queensland) the close period extends from the 1st December in each year to the 30th June in the following year inclusive.

### Importation of Infected or Suspected Pigs—Prohibition Renewed.

The Order in Council prohibiting the introduction into Queensland of any infected or suspected swine or any carcass or portion thereof of infected or suspected swine from the States of New South Wales, Victoria, South Australia, Western Australia, and Tasmania has been renewed for a further period of twelve months. This Order in Council shall not apply to or affect the introduction into Queensland from the said States of bacon, hams, and cured or dressed pork if no viscera or portion thereof, in an uncooked state is introduced therewith. The introduction of viscera or portion thereof in an uncooked state is prohibited. Further, pigs for immediate slaughter, which in the opinion of an inspector are healthy, may be admitted with the approval of the Minister for Agriculture under such conditions as may be imposed by him.

### The Real America.

"Most generalisations about the United States may be set down as false. The country is too vast, its life too many-sided, and the elements of it too heterogeneous, to be covered by any single formula. For example, it is not true that the people are bound body and soul to the worship of the 'almighty dollar.' Vast numbers of them are, but the forces which resist materialism are also in evidence, and are active everywhere. The intellectual life of America is marked by an intense eagerness to learn. One might almost say that the American mind welcomes disturbance by new ideas. The hunger for knowledge is widespread, like the diffusion of wealth. It is true that knowledge is mostly valued as a means of earning money, but that is by no means the end of the story. The interest in education is widespread, and though the quality of American education has many glaring defects, these defects are well known to the leaders of American thought, and immense efforts are being made to remove them."—Principal Jacks.

### The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Lecture Theatre of the University on Monday, 29th July, at 8 p.m. The President (Professor J. P. Lowson) was in the chair.

The secretary (Mr. F. A. Perkins) read extracts from a paper by Dr. John Legg entitled "Some Observations on the Life History of the Cattle Tick."

Dr. W. H. Bryan and Dr. F. W. Whitehouse read a paper entitled "A Record of Devonian Rhyolites in Queensland." The paper reviewed the evidence of the occurrence of Devonian rhyolites at Kangaroo Hill and Mount Coolon, and placed on record several other rhyolitic series (some of proved Devonian age and others apparently belonging to that period), discovered by one or other of the authors within the last few years, from the following localities:—Herberton, Mount Etna, Tungamull, Mount Morgan, Raglan, Gore.

Dr. W. H. Bryan exhibited: (1) An amethyst-coloured specimen of halite (rock salt) obtained by the Chief Government Geologist (Mr. B. Dunstan) from the Kaiserrode Mine, Borken, Germany; (2) a specimen of decomposed but unweathered granite from the Ashgrove Quarry, Brisbane, containing purple crystals of fluorite associated with quartz and zeolites. This marked the first record of fluorite from the Enoggera granite.

### Open Season for Ducks.

As a result of an Order in Council issued on the 8th instant, a variation of the open season for goose and duck in certain portions of Queensland is provided for. The present open season in No. 1 district of the State, which includes Southern and Central Western Queensland, has been extended to the 30th September next, and thereafter the season will be closed until the 1st May next. In that portion of No. 2 district situated south of the 22nd parallel of south latitude, and which includes an area approximately bounded by St. Lawrence on the north, Bororen on the south, and Clermont on the west, the season will be open until the 30th November next, and will be closed thereafter until 1st July next. In the northern portion of the State the present open season will extend to 31st October next, and will be closed thereafter until 1st June next. This will provide an open season of five months in each year throughout Queensland.

### The State Clydesdale Stud.

The Minister for Agriculture, Mr. H. F. Walker, has announced that six years ago six Clydesdale stallions were purchased by the late Government and their services were utilised in different districts for the improvement of the draught horse stock of the State. Altogether 1,670 mares were mated, and as a result, from the satisfactory number of foals each year, there had been a decided improvement effected in the type and quality of the young draught stock in the agricultural districts where these sires were used. It had been decided, however, that in future this practice will be relinquished, in so far as the State ownership of the stallions is concerned, and that the four stallions—General Wallace, Premier Again, Bold Wyllie, and Prospector—were to be offered at auction at the Exhibition sales. All the horses have been regularly exercised and are in first-class condition, and in consequence they should be fit for the approaching season's duties. In the hands of good horsemasters these stallions should have several years of useful stud work before them.

### Out of Doors.

"You have noticed how colour is brought to the cheeks by exercise in the open air, how the functions are quickened, and the spirits lightened—there is an exhilaration to be imbibed such as no artificial therapy can promise. Pure atmosphere contains elements of nourishment, as necessary as the daily portions we attack with knife and fork. Invisible, it yet sustains and purifies—it is the one item of our dietary to be taken without fear of surfeit," says Reddie Mallett, in "Nature's Way Monthly." "Not a soul has truthfully said that fresh air had undermined his strength. Cows, grazing in the fields, give better milk than those stall-imprisoned; the latter inhale less nitrogen, and thereby suffer. Get out of doors, then; let the kiddies draw from the illimitable fount of health."

### The Fountain of Wisdom.

"Wisdom, after all, comes by suffering, and, though no doubt it is easy to point to some limiting and narrowing consequences of the particular facts of his life, the splendid genius of Dickens, far from being, as it might have been, embittered or undermined, emerged from a long series of ordeals not only with strength undiminished and brilliancy undimmed, but, perhaps, also with no little gain in tenderness, in insight, and in sympathy. And so it came about that, although, perhaps, he reaped and enjoyed too little of 'The harvest of a quiet eye that broods and sleeps on his own heart,' nevertheless, this sad man was able to make others laugh; this unhappy man was able to make others forget; this great-hearted poet in the true sense of the term, himself self-educated, was and will be the cause of education in millions of his fellowmen."—The Lord Chief Justice of England, Lord Hewart.

### The Age of Power.

"We are living in a power age. Power must be properly used, or it will destroy us. We are due for a big change in educational methods. That is one of the reasons why we are at present trying out our trade-school form of teaching. It seems to be the tendency of our generation to want things in tabloid form. . . . Such a process is likely to stunt our reflective power. . . . The great problem in the home to-day is that there is too much drudgery there. . . . There has been no decrease in the hours of wives. We should spend more time in the study of food and how to eat it. Most of us eat too much. We eat the wrong kind of food at the wrong time, and ultimately suffer for it. When men are job-centered they are less self-centred, and there is, therefore, less soil for the interference of personal likes and dislikes, personal pride, and personal prejudices."—Mr. Henry Ford.

### Wool Baling.

When baling wool, the bales should be as even in weight as possible. Between 300 lb. and 336 lb. is a good weight for fleece wool, "pieces," "bellies," &c., usually being heavier. To get fairly even weights of fleece wool it is a good idea to count the fleeces into the bale, and when it is weighed one has a guide to go on. In a small clip a few mixed bales are unavoidable, but as few as possible should be made, and when two lots of wool are put in the one bale, be sure they are of about the same value, because the bale will always be valued on the lowest wool in the bale. It pays the farmer to market his wool clip as far as possible in even lots—even in quality, length and condition.

### When Feeding Scrub Supplement the Ration if Possible.

Native scrub and trees such as kurrajong, wilga, mulga, myall, willow, currant bush, emu bush, gidgea, and whitewood have a considerable value during such times as those through which pastoralists are unfortunately now passing, but it must always be borne in mind, writes an officer of the Stock Branch of the New South Wales Department of Agriculture, that these are only emergency fodders. They do not provide a balanced ration; and while alone they may keep up the health of stock for a limited period, eventually condition will be lost and signs of digestive disturbance be noted. In any case they are entirely unsuited to lambing ewes. Their value is much increased by—

1. The addition of small amounts of grain or meal concentrates daily, say, 4 to 8 oz. per sheep.

2. The addition of salt, Epsom salts, and molasses in the form of a lick. This acts as a corrective, and lessens the liability to impaction of digestive organs. The proportions might be—1 part Epsom salts, 3 parts Liverpool salt, 4 parts molasses. The amount of Epsom salts might be increased if deemed necessary. Sulphate of iron, although it is recommended as a good tonic in normal seasons, should not be used, as it is an astringent and increases the liability to constipation.

3. Add a little hay to the above ration. If hay is added even only once or twice a week the stock would resist the adverse conditions more successfully.

### Making Concrete—Material Required.

The question is often asked, "How much cement, sand, and metal will be required" for a particular job when making concrete. The table given below, which shows the cubic feet of cement, sand, and stone needed for 1 cubic yard of various mixtures, will, in conjunction with the appended explanation, enable the computation of the necessary quantities:—

*Materials required for 1 cubic yard of concrete.*

| Mixture. | | | Cubic Feet. | | |
|---|---|---|---|---|---|
| Cement. | Sand. | Stone. | Cement. | Sand. | Stone. |
| 1 | 2 | 4 | 5·84 | 11·88 | 23·76 |
| 1 | 2·5 | 4 | 5·44 | 14·04 | 22·14 |
| 1 | 2·5 | 5 | 4·76 | 12·42 | 24·57 |
| 1 | 3 | 5 | 4·52 | 13·77 | 22·95 |
| 1 | 3 | 6 | 4·00 | 12·42 | 24·84 |
| 1 | 3 | 6·5 | 3·84 | 11·88 | 26·65 |

If, for instance, it is desired to lay a concrete floor 4 inches thick gauged 1:3:6, in a room 12 feet by 14 feet, the total quantity of concrete required will be $12 \times 14 \times \frac{1}{3} = 56$ cubic feet = (approximately) 2 cubic yards. From the table of quantities for a 1:3:6 mix it will be seen that for 1 cubic yard of concrete the materials required are 4 cubic feet of cement, 12.42 cubic feet of sand, and 24.84 cubic feet of metal. Therefore, for 2 cubic yards twice these quantities will be required. If, say, 8 cubic yards of concrete were required for a job, the quantities in the table would be multiplied by eight. As a bag of cement contains 1 cubic foot, the quantity of cement required, as computed in cubic feet, is the quantity in bags.

For rendering, a bag of cement mixed with two equal bags of sand will cover about $8\frac{1}{2}$ square yards, $\frac{3}{8}$-inch thick, and $6\frac{1}{2}$ square yards, $\frac{1}{2}$-inch thick.

## Green Pea Cultivation.

Growers of green peas are reminded of the importance of an early preparation of the soil.

The water requirements of a crop of peas are considerable, and the preparation of the soil should be commenced sufficiently early to enable a supply of moisture to be stored. The land should be cultivated as required to conserve all rain that falls, to destroy weeds, and to produce a good tilth in which the roots will find favourable conditions. Every effort should be made to induce germination of weed seeds before the crop is planted. If this is done the subsequent cleaning of the crop will be much easier. During the picking season there is often little time to attend to the destruction of weeds, hence the necessity for thorough cultivation during soil preparation and early stages of growth. A good strike of weed seeds can usually be controlled by harrowing, which is so much quicker than inter-cultivation work, which would be necessary once the crop is planted.

A sandy loam is most suitable for the crop, but almost any soil of fair average quality will yield good results. As with all legumes, the supply of nitrogen in the soil is matter of less moment than that of phosphoric acid, potash and lime, and hence it is that in some localities dressings of fertilisers that contain the last three have a material effect upon the yield. The crop has the strong recommendation that, in addition to yielding profitably, it contributes to the fertility of the soil for the purpose of subsequent crops by increasing the store of nitrogen, and by enabling the gardener or farmer to add to the soil a considerable quantity of top-growth of a kind that humifies readily when turned under. It does well on newly broken land, and can be used as a preparation crop.

## Points in Citrus Packing.

Though citrus fruits do not show injury from bruises for some time after picking, in reality the oil cells of the skin are very easily damaged, and it is through such injuries to the skin that decay germs, such as those causing blue mould, make their entrance; hence great care is necessary when picking and packing for market. Gloves should be worn or the finger nails kept extremely short, and the fruit should be clipped with the button adhering but with no length of stalk to come into contact with and puncture other fruit. The fruit should be placed right into the picking receptacle, and not dropped in from the top, and the same care should be exercised in all subsequent handling between picking and packing.

Though paper lining, by checking the circulation of air in the case, may tend to produce conditions favourable for the development of blue mould, the rough timber of unlined cases injures the skin and allows infection by the disease, so that lining paper is an advantage when packing citrus fruits, unless the inside of the case is planed, as is done in some other countries.

The proper packing of fruit is of great importance, as growers are now realising. Space packing has now become almost universal, and it certainly is the best method to adopt in packing fruit, as the work can be done quickly, and the fruit carries well. Moreover, the pack is attractive and is liked by buyers.

## The Prayer of a Horse.

"To thee, my master, I offer my prayer."

"Feed me, water, and care for me, and when the day's work is done, provide me with a shelter, and a stall wide enough for me to lie down. Talk to me. Your voice often means as much to me as the reins."

"Do not whip me when going uphill. Don't beat or kick me when I do not understand what you mean, but give me a chance to understand you. Watch me, and if I fail to do your bidding see if something is not wrong with my harness or feet."

"Examine my teeth when I do not eat. I may have an ulcerated tooth, and that, you know, is very painful. Do not tie my head in an unnatural position, or take away my best defence against flies and mosquitoes by cutting off my tail."

"And, finally, oh, my master, when my useful strength is gone, do not turn me out to starve, or sell me to some cruel owner to be worked and starved to death; but do thou, my master, end my life in the kindest way. You may not consider me irreverent if I ask this in the name of Him who was born in a stable."—Translated from the Arabic.

## Lucerne—A Reminder.

The value of top-dressing lucerne with superphosphate as a means of increasing the yield has been proved by trials in various parts of the State. Lucerne, being a legume, can gather nitrogen from the air, and by means of its wonderful root system can traverse a wide area in search of the other necessary plant foods, but the crop makes heavy demands on the soil, and if the stand is to last as long as possible and to yield the utmost profit nothing must be neglected that will help to invigorate and maintain it. The usual cultivation in early spring is not sufficient if the best results are to be obtained.

Top-dressing with superphosphate is advantageous in four ways:—

(1) The green fodder yield is greatly increased.

(2) A better quality product results—in fact, a healthy, dark-green colour is noticeable throughout the whole growing period.

(3) The general condition of the stand is built up consequent upon the vigorous growth developed.

(4) The useful life of the stand may be extended, and depleted stands largely restored.

Recent experiments indicate that the early spring is the best time to apply dressings of superphosphate. It is advisable first to stir the surface soil with a springtooth cultivator, and then to apply the superphosphate through the wheat drill, with the tubes loosely adjusted so as to give a broadcasting effect, or use a top-dressing machine to spread the fertiliser. Where there is no wheat drill or top-dressing machine, as on a good many coastal farms, it is better to broadcast the superphosphate by hand than to neglect the operation.

The dressing should be at the rate of about 2 cwt. per acre; where the method is broadcasting a slightly heavier application can be made with advantage.

## The Laying of Poison Baits for Animals.

The Society for the Prevention of Cruelty has approved of the following standing warning:—Persons laying poison on their property are reminded that it is unlawful for the occupier of any town or suburban land to lay poison on his land for the purpose of destruction of dogs or other animals. The occupier of any land beyond the limits of the town or suburban lands may lay poison on his land for the purpose of destroying dogs, but notice of such being laid must be advertised in three successive issues of any two papers circulating in the district where such land is situated or in the "Government Gazette," and must also be conspicuously exhibited on such land, and in no case, must the poison be laid within two hundred yards of any public road.

### Some First-aid Remedies for Poisoned Animals.

*Emetics.*—The quickest is 20 grains of sulphate of zinc, dissolved in half a tumbler of water. Failing that, a dessertspoonful of mustard mixed in a tumbler of lukewarm water, or even the warm water alone with or without a tablespoon of common salt in it. A quid of pipe tobacco pushed down the throat can be used in emergency.

After cleaning the stomach, give large quantities of milk, whiting scraped off a wall, and water, white of eggs, butter, or any sweet oil.

It is best to administer doses of liquid by closing the dog's mouth, drawing one corner of its mouth outwards so that the lower part of the cheek forms a pouch, and pouring medicine into same a little at a time as the dog swallows it. Do not hurry, or you may choke the dog, and be careful not to interfere with the breathing by pressing on the nostrils.

If magnesia is unprocurable, use lime or the scrapings off a white-washed wall.

Arsenic Poisoning.—Symptoms: Intense pain, heat and tenderness of stomach, distressed and painful breathing, vomiting and diarrhoea.

Treatment.—Give emetic and large quantities of oil and butter; 4 oz. of magnesia in water. Keep up strength with wine or spirits and water.

Phosphorus.—Give emetic and repeated doses of magnesia in water, followed by one teaspoonful of turpentine in a little milk.

Strychnine.—Symptoms: Violent and continued spasms.

Treatment.—Give emetic, then extremely large doses of spirits and water, or of chloral.

## Tyred Pedestrians—The Shoes of the Car Become the Shoes of Man.

A brisk trade in a new type of footwear is being created by the cobblers of Albania, Turkey, and parts of Persia. They are making shoes out of old "Dunlop" tyres by the simple process of cutting well-worn motor tyres into the required lengths, fashioning a toe and tongue, and lacing a thong of leather around the top to bind the whole together. The finished article resembles a Dutch sabot, and a traveller who has just made a tour of the Near East reports that in the bazaars the demand for the new shoes is great, because they cost less and wear longer than sandals or the more modern boot.

## Hydatid Disease—Its Nature and Control.

What are "hydatids," in what way is the disease contracted, and by what means can it be controlled? These questions are of particular interest to country dwellers, because the country dog is the most common agent of man's infestation. The character of the disease and the measures necessary for its control are the subject of an informative article in a recent "New South Wales Agricultural Gazette."

Hydatid disease, it is stated, is perhaps the most important parasitic disease of man in Australia. It is caused by the presence in the internal organs of large bladder-like cysts, which are larval or immature stages in the development of a very small tapeworm of the dog. Cattle, sheep, and pigs are all very commonly affected.

The adult tapeworm referred to is so small that unless very carefully looked for it will not be seen. The eggs of the worm pass on to the soil, and may remain there for some weeks, but cannot develop unless swallowed by either man or some other animal. In the case of domestic animals the eggs are swallowed with the grass as the animals graze over the infected pastures. They hatch in the intestines and a minute larval worm emerges, bores into the bowel wall, and enters a blood vessel. It is then carried to the liver, lungs, or other organ and development into the cyst proceeds. These cysts interfere with the normal functions of the organs. If a liver or other organ containing this cyst is eaten by a dog, the tapeworm head enclosed in the cyst attaches itself to the wall of the dog's bowel and develops again into the adult worm.

*How Man Becomes Infested.*—Man cannot become affected from eating the cysts of sheep or cattle, and if no dogs were allowed to eat organs containing these cysts all danger of man contracting hydatid disease would cease. One of the methods by which man most commonly becomes infested is by carelessness in handling country dogs, inasmuch as if the dog happens to have some of the eggs of this tapeworm on its coat they may be transferred to the man's hands and thence to his food if he neglects to wash his hands, and so into his system. The danger is naturally greatest in the case of children, who exercise less care in personal cleanliness.

Contaminated water and green vegetables, which were at one time regarded as the most common sources of infection, are probably not comparable in importance with that just mentioned. It is possible that flies may infect food with the eggs of the tapeworm, which is another argument for the many in favour of fly control. The cleanly habits of the house cat make it a less probable source of infection than the dog. Foxes and dingoes are probably an important factor in the infection of stock.

Unfortunately, the presence of tapeworm in a dog does not give rise to any noticeable symptoms. From the circumstances under which they live, country dogs are far more likely to be infected with this tapeworm than city dogs.

*Control.*—Control of the disease may be attempted in two ways—firstly, by preventing infection of man and herbivorous animals, and, secondly, by preventing infection of the dog. The second is the more important factor.

Since the dog can only become infected by eating hydatid cysts in raw meat, the complete prevention of this habit would go very far to eradicate the disease in man, and would be a considerable step forward in preventing the disease in animals. The dogs most likely to be fed on raw meat containing hydatid cysts are station dogs and slaughter-yards dogs. Where sheep are killed on a holding for rations the greatest care should be exercised to see that no infected organs are thrown to the dogs to eat. They would, of course, be quite harmless if boiled for ten minutes. Keeping the organs and feeding them later will not prevent the dogs from becoming infected, as the cysts may, in winter, remain alive for some weeks. No dog should be allowed into slaughter-houses, and on no account should raw organs containing hydatid cysts be given to them to eat.

Only water from a source which cannot become contaminated by the excrement of a dog should be used for washing down slaughter-houses, and every effort should be made to keep dogs free from tapeworms.

### "Do" and "Don't" in Poultry Marketing.

Here are some humane reminders taken from the last annual report of the Queensland Society for the Prevention of Cruelty.

"DO."

Do see that poultry are not overcrowded in crates.

Do see that your crates are not left out in all weather conditions at railway stations awaiting despatch.

Do send timely advice to the consignee so that poultry may be promptly called for and not left at a railway station famishing for food and water.

Do see that suitable tins are secured in opposite corners of your crate and filled with water, also arrange for refilling on transit or while the birds are awaiting sale.

"DON'T."

Don't place poultry in a crate of less height than the birds placed therein.

Don't put poultry in a crate with open spaces between the bottom boards. This causes the birds to get their legs broken or injured. Crates should be constructed with a wooden frame and bottom, and wire-netting sides.

Don't overcrowd your crates. The following dimensions of crates are given for guidance of consignors:—

For twelve pigeons and chickens the crate is required to be 2 feet long, 14 inches wide, and 9 inches high.

For twelve fowls or common ducks, 3 feet 6 inches long, 2 feet 6 inches wide, and 18 inches high, or a space of about 1¼ cubic feet per bird.

For ten geese or turkeys, 6 feet long, 2 feet wide, and 2 feet 6 inches in height, or a space of 3 cubic feet per bird. This crate should be cross partitioned, keeping the birds in two lots.

Any alteration in the number of birds could be met by a corresponding alteration in the size of crates.

Don't send poultry with their legs tied together or tied to other birds.

Don't send turkeys or geese in a crate with smaller poultry, such as fowls or ducks. It involves cruelty to the smaller birds.

Don't forget in consigning poultry to market contrary to conditions set out, or in any manner which involves cruelty, leaves the consignor liable to a fine of £25 or six months' imprisonment.

Don't forget that the inspectors of the Queensland Society for the Prevention of Cruelty visit the poultry market, and that henceforth the law will be enforced, and that court cases are costly in time, money and reputation.

A similar circular was distributed per medium of the "Poultry Farmers' Journal" to over seventeen hundred poultry raisers, and the circular has been supplied to the poultry dealers who have promised to send out copies with account sales to their clients. In this way almost every raiser has been reached. So that from now on, pleading ignorance of the law cannot be accepted as an excuse.

We are glad to be able to say that as a result of the action taken a very great improvement has been effected, and the poultry farmer will profit because the heavy loss in birds will be avoided.

*A USEFUL JOURNAL FOR THE FARMER.*

*A Kingaroy producer writes (13th August, 1929):—"It is with much pleasure that I forward my renewal subscription for the 'Queenesland Agricultural Journal.' I feel grateful . . . . for its usefulness to the man on the land."*

## British Thrift.

"The volume of capital owning by the mass of the people is now immense. Despite the lean years, in which many 'nest-eggs' have been used up, the Trustee Savings Banks hold for 2,410,000 depositors nearly £114,000,000 in deposits and £33,000,000 in stocks or bonds, while the ten million accounts in the Post Office Savings Banks amount to over £284,000,000," says a writer in the "Quarterly Review." "Meantime War Savings Certificates, already in 1918-19 amounting to just short of £227,000,000, now total £362,000,000, and in 1925-26 even rose to £375,500,000 (interest in each case being omitted from these figures). The consumers' co-operative movement has capital and reserves of little short of £170,000,000, while another £91,000,000 is held by Friendly Societies. But perhaps most striking, as showing the development since pre-war days, are the figures of the Building Societies. With some 600,000 members and assets of £61,000,000 in 1914, their membership is now well on the way to 2,000,000 persons, and their assets have increased to £225,000,000."

## Some "Don'ts" for Horse Owners and Drivers.

Don't fail to rug your horse when he stands in the cold.

Don't forget that ills often result from exposure and chill which follows suddenly-checked perspiration.

Don't fail to keep your horse well shod.

Don't work a lame horse or you may make a temporary injury a permanent one.

Don't let any alleged blacksmith lame your horse. Do you cut your own feet down to fit your boots? Well, don't forget that your horse's shoes should be shaped to fit his feet, and not his feet shaped to fit his shoes.

Don't load your horse too heavily, especially when the streets and roads are wet and slippery.

Don't force him to back a heavy load over a slippery road or uphill.

Don't fail to oil your wagon axles. There is a heap of humanity in wagon grease.

Don't put badly-fitting harness on your horse.

Don't forget that there is more profit in coaxing a horse than in kicking him.

Don't thrash your horse if he jibs. Lift his collar and wipe it and his shoulder, and let the air at them; then tie your whip thong round his foreleg just below the knee and pull his leg forward to start him. Try it.

## Railing Stock to Market.

Another extract from the same report:—This is another matter that the Society has been concerned about for some years. The Society keeps hammering away on the subject. We have got in touch with the Railway Department, the United Graziers' Association, and the Brisbane Fat Stock and Produce Association, through whom most of the stock are sold at Newmarket Sale Yards. The Commissioner for Railways seems to be really anxious to minimise the trouble, realising as he does, the heavy losses sustained. An instance of which it may be mentioned that in January last, of the cattle arriving and handled at Newmarket Sale Yards, 26 head were dead and over 200 head injured. Fat bullocks at that time were bringing from £10 to £12 per head. The dead bullocks are disposed of to a pig farmer at a mere nominal sum, and the injured at a very much reduced price, so that the loss sustained during that month may be reasonably approximated at about £1,000. These losses are mainly due to want of care in long railway journeys. A competent careful man should accompany every cattle train, look over all trucks at every stopping place, and get the assistance of the train crew to lift any cattle that are down. This with more careful loading and unloading would minimise the trouble considerably, and in this connection it may be mentioned that the officers of this Society, who visit the sale yards frequently, on one occasion found over 20 sheep horns embedded in the ground where a truck of sheep had just been unloaded. Instead of using a ramp or gangway, which was provided by the Railway Department, for the sheep in the top story of the truck, they were forced out by the employees at the sale yards, a number of the sheep falling on their heads drove their horns into the ground, and in releasing themselves wrenched off the horns. The visits of the Society's Inspectors have considerably checked this rough work, but they cannot attend the unloading of every stock train, and the Society gets very little encouragement from stock owners, only in one instance, and that by the Warrego Branch of the Graziers' Association has our work been recognised.

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.*

### WHAT EVERY BABY NEEDS.

A good deal has been written in these pages concerning the importance of the correct feeding of infants, but so far little mention has been made of other factors which require regular and daily attention. With good feeding alone, even the best possible feeding with mother's milk, we cannot hope to attain the highest standard of health for baby, though, as will be pointed out later, careful feeding will ensure that other of his needs are also receiving attention.

Doctor Sir Truby King, of New Zealand, the world-famed authority on infant welfare, has called the points which should receive daily and careful attention, the "twelve essentials" for baby's health.

#### Fresh Air for the Infant.

The first essential is fresh air. In his earliest months, more than at any other time in his whole life, baby requires pure fresh air. Not only is it required to purify the blood, but at this time baby is growing very quickly, and for this reason also it is important that the air he breathes should be of the purest and freshest. Most mothers see that baby has fresh air in the daytime by putting him on a veranda to sleep, but at night, when his need is just as great, he does not always fare so well. Not infrequently, the baby shares his mother's bed, where he lies cuddled in to her side, and perforce is breathing stuffy and used-up air. Some mothers think that baby, sleeping by himself, would not be sufficiently warm, but the healthy baby who is comfortably warm when put to bed, does not require the warmth of his mother's body to keep him so. When the weather is very cold he could have a hot bottle or rubber bag in his cot, carefully covered, and so placed that he could not be burnt by it. At night he should sleep in a well-ventilated room, with doors and windows open to permit of a constant moving current of fresh air. This should be the rule, summer and winter. Even in winter, in Queensland's beautiful climate, baby could sleep on a veranda. Pure, cold air will do him no harm. The cot, whether in a room or on the veranda, should be placed so that it is not in a draught. The baby who is accustomed, day and night, to fresh air, is much less likely to contract colds and other illnesses than the one who sleeps at night in a stuffy room. Another way of depriving a very young baby of the air it needs is by pinning a handkerchief to the front of its bonnet when it is taken out, so that the handkerchief lies over the little face. This is done with the intention of protecting baby's eyes from glare, but it is possible to hold a baby so that its eyes are protected from the light without depriving it of air. If the mother once tried going for a walk for an hour, with a handkerchief close against her face, she would, long before that time was over, feel the need for more air, and would not again treat her baby in that way.

Leather-hooded perambulators, some of which do not permit of free ventilation, can be stuffy and unhealthy.

#### The Value of Clean, Cold Water.

Another essential for baby is water. From birth babies should be given some plain cool water daily. They get thirsty at times, just as grown people do, especially in the summer when the skin acts freely. Milk is food and not a drink for the baby, and will not quench his thirst and satisfy him when he is thirsty, as well as some plain cool boiled water. For the baby who is fed on his mother's milk, a spoon and cup should be used, and for the "bottle baby" his feeding bottle. He soon learns to like, and to look for, his drinks of water. In illness, the habit of water drinking can be valuable. The sick baby who, from any cause, has his food lessened or stopped, and who refuses to drink water, has a poorer chance of recovery than the one who drinks plenty of water. Give him as much as he likes; it will not hurt him, whether he is ill or well.

### Suitable Clothing.

Suitable clothing is another essential. In clothing a baby the most important point to remember is that the first, and main object, should be comfort for the baby. The patterns should be simple, so that the garments are easy to put on and take off. They should hang from the shoulders and have no tight bands to hinder development. The materials used should be porous, non-irritating, and light. The clothing should be loose and either warm or cool, as the weather and the child's condition may demand. Under all conditions too heavy or too many garments should be avoided. They should be made in such a way as to ensure easy washing, drying, and ironing. Unnecessary thicknesses of material, which are difficult to air well should be avoided.

No hard-and-fast rule can be made as to the number of garments required by an individual child. Very young, small, or feeble babies require warmer clothing than those who are larger and stronger. Coldness of hands and feet and blueness of lips would generally indicate need for more clothing. Overclothing, which should be guarded against in hot weather, may cause restlessness, fretfulness, and increased perspiration.

### Bathing.

The daily bath is an "essential" for baby, and is necessary, not only for bodily cleanliness, but also for the health of the skin, which has important work to do in ridding the body of waste matter. If the pores become blocked the skin cannot act properly, and the health of the whole body suffers. If baby is feverish or ill, substitute warm sponging for the bath, but whether well or ill, baby's skin should be washed all over every day. Remember that a baby's skin is very delicate. Avoid using hard water or strong soap.

### Exercise of Muscles.

In baby's earliest days, sucking and crying are his chief forms of exercise. Vigorous sucking is valuable exercise. It strengthens baby's jaws, and helps in the development of his teeth. If he is bottle-fed, see that the hole in the teat is not large enough to let the milk flow through in a stream so that he gets it without effort. In his own interests the bottle-fed baby should work just as hard to get the milk from the feeding bottle as he would have to do if fed by his mother.

Crying exercises and strengthens his lungs and improves the circulation in the whole body. For this reason a certain amount is healthy. The mother who picks her baby up each time he begins to cry is not only spoiling him but depriving him of healthy exercise. When baby is three months old he should be allowed to lie and kick, unhampered by clothing, for about half an hour, morning and afternoon. Protect him from draughts, clothe him loosely and unfasten his napkin so that his movements are quite free. In a very little while he greatly enjoys and looks forward to this daily exercise.

### Training of Senses.

The skin is stimulated and the sense of touch trained by such things as the daily bath, exercise in the open air, handling, and comfortable clothing. Sight is trained by placing baby where he can watch people moving, see branches of trees waving, or other moving objects. Hearing develops early and is stimulated by ordinary daily sounds and by talking to the child, though mothers should not do too much of this. The sense of smell does not develop early. Taste is acute, even in very young babies.

### Warmth.

The body temperature needs to be evenly maintained. In cold weather clothe baby so that all parts of the body are protected from chill. If the body is warm, pure cold air, day or night, will do no harm. In hot climates the aim must be to keep the child cool, but remember that young children chill quickly. Cold hands or feet can cause acute discomfort and prolonged crying.

### Regularity of all Habits.

Regularity in baby's life should begin when he is born. In particular, there should be clock-like regularity of feeding, bathing, bowel action, sleeping, and exercise.

### Cleanliness.

This does not mean baby's personal cleanliness only. The mother's hands and nipples should be regularly washed before the child is fed. If baby is "bottle-fed," much care and attention must be given to the food and all the appliances used, which must be scrupulously clean and protected from flies. Never leave dirty linen in baby's room. Remove soiled napkins immediately and place them in water. Always wash the hands thoroughly after handling napkins.

### Mothering.

Proper handling is necessary for the best growth and development of baby. Infants who are allowed to lie passively all day in cots become pale and languid and do not thrive. Baby should not be nursed all the time he is awake. He grows and thrives better if left to kick and amuse himself. But do not leave him too long unnoticed, or in the same position. Speak to him in passing, turn him from side to side, or prop him up with pillows. A change of position is a relief and rest for baby, just as it is for older people, and it also gives him the attention which, among other things, means the mothering of the child. On the other hand, too much attention can do much harm. Do not constantly talk to or play with baby; it is tiring to his brain, and a strain on his nervous system. Too little attention may result in the child being listless and unhealthy; too much attention can upset his nervous system and turn him into a spoilt little tyrant.

### Management.

This consists in carrying out daily and regularly all the essentials for the child. Do not feed him or give him a dummy because he cries. Teach him to understand that he cannot get his own way simply by crying for it. By your own example teach the child to have faith in you. Even to a baby never make a promise that you do not intend to keep.

### Rest and Sleep.

These depend on the carrying out of the above essentials. If baby is fed, clothed, cared for and managed properly, he should sleep well. If he does not, look for the cause and try to remove it.

Newly-born infants should sleep about nine-tenths of their time; that is twenty-one hours out of twenty-four. At six months they should sleep about two-thirds of their time, that is about sixteen hours out of each twenty-four.

Mention was made in the previous article that the correct feeding of a baby ensured correct training in some other directions also. If baby is fed correctly and regularly, he is being trained to punctuality and regular habits. By giving him no night feeds from birth, he has the opportunity for the uninterrupted rest and sleep which is so necessary for him.

Attention during the first year to "Baby's Twelve Essentials," not only makes for his health and happiness during his first and subsequent years, but forms, on the right lines, the foundation of his character.

## KITCHEN GARDEN.

Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 feet apart with 18 inches between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

## FLOWER GARDEN.

The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

# MARKET GARDENING.

## Starting a Garden.

In selecting a site for a market garden there are four essential points to be considered—water, soil, aspect, and shelter. Another point to be remembered is that, in growing garden stuff for sale, there is also the question of convenience to rail and market to be taken into consideration.

To attain any degree of success in market gardening a good water supply is an absolute necessity. As a rule, the best situation for a garden is on the bank of a creek or near a lagoon or waterhole; but, if none of these is available, the alternative is to sink a well or make a dam, *for water you must have.*

There may be months and months during which no watering will be required, but it is quite certain that sooner or later a dry spell will come, often in August and September, when most vegetables should be vigorously growing, and if you have no supply you will probably lose the result of months of labour. Therefore, whether your garden consists of 20 acres or 20 perches, be certain that the water supply will keep it going at all seasons of the year.

## The Soil.

You may rest assured that you cannot have too rich a soil for market gardening. But, at the same time, if a very rich soil be unobtainable, it is very easy to make it rich by a liberal and judicious use of manures; and it must be made so if you are to have success in growing cabbages and cauliflowers.

The deep alluvial flats commonly found near the banks of many of our creeks and rivers are ideal soils for this class of produce, being usually very rich in humus, resulting from decayed vegetable matter. Such a soil contains all the elements necessary to produce high-class vegetable crops. A light, sandy loam is better for such crops as onions, carrots, and plants of similar habit; but, as it is not always possible to get several kinds of soil within the limits of a garden, it follows that the soil must be made, as far as practicable, to suit each different crop by varying methods of treatment and manuring.

In locating the garden, it is well not to have it too far from the dwelling; in fact, if the house is *in* the garden, so much the better.

As to aspect, if the garden is on a slope, the fall should be to the east; but a level site is preferable, as level ground can be more easily and economically worked than a slope, and there is not the danger of both soil and crop being washed away during heavy rains, or of the valuable soluble portions of manure, where applied, leaching out, which effects are always to be feared in a garden located on a hillside. Then, if possible, the garden should be protected against heavy winds by a ridge or belt of timber.

In clearing scrub lands for a garden, it is advisable to leave a belt of trees standing on the side from which the prevailing winds blow. This belt should be 2 or 3 chains wide, and not sufficiently close to the garden to interfere with the free access of light and air to the plants.

## Preparing the Land.

In preparing the land for gardening, deep working is recommended. Get down 15 in. or 18. if you can. If you use horse implements, break up the subsoil with a subsoil plough, but be careful not to bring the subsoil to the surface. The advantage of this deep working will be chiefly apparent in a long spell of dry weather, when plants in deep soil will be found to grow and thrive, while others in shallow soils will require constant care and watering to keep them alive. Should the ground be very level or wet in places, such parts should be drained either by means of surface drains or by one of the cheap methods of under-draining. The land being thoroughly broken up and brought to a fine tilth, the next step is to mark it off in sections for the various kinds of crops that you wish to grow.

If the garden is small and horses are not used, then a lesson may be learned from the Chinese gardeners, and that is, to make the beds of such a width as to obviate the necessity of trampling on them when weeding or transplanting. Very narrow pathways between the beds will suffice to give access to them, so that not much space is lost in this manner. But no hard-and-fast rule can be laid down. It is all a matter of convenience and circumstances, but always bear in mind that, even in a small garden, horse labour is cheaper than hand labour; therefore, arrange things in such a manner that as much of the work as possible may be done by means of horses.

Never sow garden crops of any kind *broadcast.* This is an obsolete custom, which, in view of the means now provided for sowing seeds by seed-saving implements, should have been done away with long ago.

This broadcasting of garden crops cannot be too strongly condemned, as it is wasteful, untidy, and unprofitable, except to the seed-sellers, who are the only people who benefit much by it.

Always sow in rows, and have the rows far enough apart to enable you to use either horse or hand cultivators between them. By following this system it is easy to keep the ground clean, and also to keep it open, and conserve the moisture by cultivation—a thing which cannot be done effectively where crops are sown broadcast.

A very simple hand seed-sower for small seeds may be made out of a tin, by boring a couple of small holes in the bottom sufficiently large to allow the exit of a seed. Fasten this to a wooden handle and shake as you go along the drill. There will be very little waste of seed.

## Sowing the Seeds.

Cabbages, cauliflowers, and various other kinds are mostly raised in seed-beds; and it will be found better to sow all these in narrow shallow drills in the bed than to sow broadcast. Young plants grown in drills are much easier to lift and transplant than if broadcast, and as a rule are stronger and sturdier. In preparing the bed, the soil should be raked as finely as possible, and the seeds must not be sown too deeply. A quarter to a half inch of soil above the seed is usually enough. If the drills are covered in with a little, very fine, and thoroughly rotten manure, germination takes place quickly, and in transplanting, a ball of the manured soil will readily stick to the rootlets, which, not being unduly disturbed, thus affords the plants a greater chance of success.

In preparing soil for seed-sowing in the open ground, always have the soil thoroughly tilled, cleaned from weeds, and well pulverised. A harrow immediately following the plough will reduce most soil to a very fine tilth; and if not, the rake must be used to finish off, especially with such seeds as carrots and onions and plants of similar habit.

Excellent hand seed drills and hand cultivators are on the market, the latter being fitted at will with tines, sweeps, or miniature plough attachment. No market gardener can afford to do without an outfit of this description.

Where enough ground is available, all strong growing crops should be sown far enough apart to permit of a horse cultivator being used.

## Transplanting.

For transplanting, the ground should be prepared, more especially for delicate plants, in precisely the same way as for seed-sowing. The finer the surface soil is, the more easily will be young tender rootlets be able to force their way down in search of food and sustenance; and as a consequence leaf growth will necessarily follow.

If the soil is hard and lumpy, the attempt of the rootlets to strike into it becomes to some extent useless, and it naturally follows that all growth is retarded, and the ultimate success of the vegetables is problematical. When taking the plants from the seed-bed, be careful not to break the roots too much, and endeavour to lift them with a little of the soil adhering. Never pull young plants up, but lift them carefully. It is a good plan to give the bed a thorough soaking with water some time before beginning to lift the plants.

Always, if possible, choose a dull or showery day for transplanting, but, should the weather be warm and dry, do the work in the afternoon, and water well after planting; and, if suitable material is procurable, mulch the ground for a few inches round each plant. Set the plants a little deeper in the ground than they were in the bed, and firm the soil well around the roots without bruising the necks of the plants.

Take care always to make the hole for planting just deep enough, so that the plant will not hang in it, and give the plants plenty of room to grow to their fullest possible size without crowding.

Should the weather be dry for some time after planting, it will be necessary to water the young plants several times a week until they become established; the watering being done either early in the morning or late in the afternoon. On unmulched land, the surface soil around the plants should be lightly stirred at intervals between the waterings to prevent crusting.

A great deal of watering and hoeing will, however, be saved if *mulch* is used as already advised. The importance of mulching cannot be overestimated. Almost anything will do—stable manure, grass, or litter of any kind, provided it can be easily and conveniently placed around the plants. Mulching prevents the ground

from baking after watering, and so saves hoeing; and it also helps to arrest evaporation and economises water; it tends also to keep the temperature of the surface soil equable and promotes a healthy and vigorous root action. Protection of this character is invaluable. Systematic mulching is confidently recommended for all classes of garden crops which require to be transplanted, and the grower who follows this practice, is assured of a greater degree of success in all operations.

### Shading Seedlings.

The object of shading newly planted-out seedlings is not to entirely exclude the sun's rays, but to break them up, so that the great heat and light may be gently distributed, until the young plants resume their natural functions and activities.

(*To be continued.*)

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## COUNTRY WOMEN AT WORK.

### IMPROVING RURAL LIFE.

"Keep us, O Lord, from pettiness—let us be large in thought and word and deed.

"Let us be done with fault-finding, and leave off self-seeking.

"May we put off all pretence, and meet each other face to face without self-pity, and without prejudice.

"May we never be hasty in judgment, and always generous.

"Teach us to put into action our better impulses straightforward and unafraid.

"Let us take time for all things—make us grow calm, serene, and gentle.

"Grant us that we may realise that it is little things that create differences—that in the big things of life we are one.

"And may we strive to touch and know the great woman's heart common to us all, and, O Lord, let us not forget to be kind."

—*Marie Stuart.*

With such thoughts to guide them it is not difficult to understand the very real success of the National Federation of Women's Institutes in England and Wales, and the reason why the institutes should now number 4,400 with a membership of 267,000.

The main purpose of women's institutes is to improve and develop conditions of rural life by providing centres for educational activities and social intercourse. The Country Women's Association in Australia has exactly the same desire, and though the way in which the institutes work to achieve this end differs so greatly to that of the branches of the Country Women's Association, this is only so because of the entirely different conditions under which country people live in England and Australia. The desire of both the Women's Institutes in England and the Country Women's Association in Australia is that each organisation shall retain its simplicity in spite of the power given it by an ever-increasing membership; both organisations wish to concentrate on simple things which directly affect country people.

As the branches of the Country Women's Association set out to gather the women in their districts, and work together to make conditions of life better for the women and children of the community, so the members of the institutes in England meet each month. The institute meetings are made very interesting by lectures and demonstrations on almost every subject one can think of, such as household jobbing, soft toy making, all kinds of cooking and preserving, poultry keeping, gardening, pruning, furniture re-covering, all kinds of handicrafts. Competitions of original thought cause much interest and fun. In one case after a talk on the potato, its history and culture, each member received a potato to set for a competition. Hundreds of dozens of eggs are collected each year by members, and are given to hospitals, children's homes, and similar institutions.

Exhibitions of women's work of every description, debates, concerts, and plays keep the interest in the meetings very keen. The international spirit of the members is very evident, and they take an active interest in the work of women of other countries. As a body the work of the institutes in providing opportunities for educational activity, assisting in securing good nursing services, more maternity and child welfare centres, and generally safeguarding the health and happiness of country people is really very wonderful.

From the work of the institutes it is seen that money-raising enters very little into its objectives; friendliness between women of all classes and creeds and the providing of interesting subjects for thought and entertainment for women in rural districts means very much more to them.

The thirteenth annual general meeting of the National Federaton of Women's Institutes was held in London at the beginning of May, and was attended by 2,700 delegates from all over England and Wales, as well as visitors from other countries.

PLATE 126.—A QUEENSLAND HOME AND GARDEN.

Mrs. Hubert Fairfax, of Queensland, attended this meeting as representative of the Country Women's Associations of the States of Australia, and was warmly welcomed. Lady Denman, chairwoman of the National Federation of Women's Institutes, addressed the delegates and said: ". . . . It must be very satisfactory to all of us to think that not only in our own country, but all over the world, country women are banding themselves together to add to their own happiness and to help on new ideas and to carry them into effect. In the past country women in most parts of the world have accepted the conditions of their lives and have had no power to alter them. They were not united in any organisation, and had no means of considering the questions which affect them and of making their wishes known. Thirty years ago Canadian women formed the first women's institute. Their lead has been followed in this country, and the movement is spreading throughout the British Empire. Simultaneously associations of country women have been growing in Europe and in the United States of America. I think it is very satisfactory to realise that now in most parts of the world groups of country women need no longer lead lives of utter loneliness. They can form an institute; they can meet and make friends; they can enjoy acting, dancing, and singing; they can study the past and consider the present questions of the day; they can take their share in promoting the good of their countries and the peace of the world."

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## FARM HOMES.

### MAKING THEM BEAUTIFUL.

Beautiful home grounds are the first essential to a beautiful State. No matter how attractive the grounds around public buildings, or how well cared for the borders of our highways, or how numerous and fine the natural beauties of the State, if our home grounds are slovenly and unattractive, then we cannot boast of a beautiful State.

Our slogan should be, "All home grounds, attractive home grounds." Do I hear some one say, "Impossible or impractical?" Not so! It is only impossible or impractical when there is no desire for attractive surroundings or lack of initiative or ingenuity in making them attractive. Too expensive! No, not necessarily, for a little labour and the seeds of a few annual flowers to be had for a few pence can often change a repulsive yard into a place which will attract attention and elicit favourable comment. Let us no longer look for lame excuses as a reason for not doing something which we know needs doing and which richly rewards him who brings about the transformation and gives pleasure to his neighbour and to the passers-by.

#### Fencing and Planting.

An attractive home ground must have the appearance of being well cared for. Nothing detracts more from a place than to have the yard littered with objects which do not belong there. This applies to the grounds in the rear of the house as well as to those in front. If it becomes necessary to store machinery or carry on certain operations between the house and barn, divide the space into two distinct areas and by proper fencing and planting hide the features which would detract from the beauty of home grounds. Twenty-five years ago one would scarcely see in a day's travel a farm home ground which was mowed with a lawn mower. But the farmer appreciates neat appearances as much as his city cousin, and as a result the lawn mower is rapidly becoming standard equipment on the farm. A hay field is attractive, but not when it surrounds the farm home. Mowing of the lawn is necessary, and the lawn mower is the best implement for that purpose. While other methods may be used for keeping the grass under control none of them produce as good a lawn or as satisfactory an appearance as the lawn mower.

#### Part of the Picture.

Make the house appear as a part of the picture you are painting with grass, shrubs, flowers, and buildings. To do this you must give the house a setting. Trees are valuable for this purpose. Tall trees at the rear of the house and at the sides at some little distance from the house are very desirable. They may not look like much soon after planting, but in years to come they will form a background and frame for the house which will enhance its attractiveness manifold. Trees may also be used along the highway, and if the lawn is fairly large, as individual specimens on the lawn, or if very large, possibly in small clumps. Stick largely to the native trees, particularly the more permanent kinds, and never plant them in rows except along the drive.—J. J. Moore, in "Hoard's Dairyman."

# Orchard Notes for October.

## THE COASTAL DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised. Unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will now only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering, as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such disease as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that

the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coastal Districts" applies equally to these parts of the State, for on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit s nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

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# Farm Notes for October.

Field.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

## DEPARTMENTAL PUBLICATIONS.

### AVAILABLE FOR DISTRIBUTION.

All the publications on this list are available for exchange with Agricultural Departments, Universities, Agricultural Colleges, Experiment Stations, and similar institutions.

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Economic Dairy Bulletins, 1D, 2D, and 3D.
Economic Sugar Bulletin, 5SC.
Economic Cotton Bulletin, 4C.
Pig Raising Bulletin, 6P.
Poultry Raising Bulletin, 7P.
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The Banana Thrips Rust.
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The Grasshopper Pest in the Springsure District.
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Turkey Rearing.
Judging Utility Poultry.
Eye Worm of Poultry.
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J. F. F. REID,
Editor of Publications, Department of Agriculture and Stock.

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# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | September, 1929. | | October, 1929. | | MOONRISE. Sept., 1929. | MOONRISE. Oct., 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | a.m. | a.m. |
| 1 | 6.9 | 5.35 | 5.35 | 5.49 | 4.25 | 4.32 |
| 2 | 6.9 | 5.36 | 5.34 | 5 49 | 5.15 | 5.6 |
| 3 | 6.8 | 5.36 | 5.33 | 5.50 | 5.59 | 5.39 |
| 4 | 6.7 | 5.37 | 5.31 | 5.51 | 6 36 | 6.11 |
| 5 | 6.6 | 5.37 | 5 30 | 5 52 | 7.9 | 6.43 |
| 6 | 6.5 | 5 38 | 5.29 | 5 52 | 7.44 | 7.16 |
| 7 | 6.5 | 5.39 | 5.27 | 5.53 | 8.15 | 7.52 |
| 8 | 6.4 | 5.40 | 5 26 | 5.54 | 8.46 | 8.36 |
| 9 | 6.3 | 5.40 | 5.25 | 5.54 | 9.22 | 9.27 |
| 10 | 6 2 | 5.40 | 5.24 | 5 55 | 10 1 | 10.13 |
| 11 | 6.0 | 5.41 | 5.23 | 5.55 | 10.43 | 11.6 |
| 12 | 5.59 | 5.41 | 5.22 | 5.56 | 11.32 | 11.59 |
| | | | | | | p.m. |
| 13 | 5.58 | 5.41 | 5.21 | 5 56 | 12.23 | 12.55 |
| 14 | 5.56 | 5.42 | 5.20 | 5.57 | 1.15 | 1.52 |
| 15 | 5.54 | 5.42 | 5.19 | 5.57 | 2.10 | 2.50 |
| 16 | 5.52 | 5.42 | 5.18 | 5.58 | 3.8 | 3.47 |
| 17 | 5.51 | 5.43 | 5.17 | 5.58 | 4.6 | 4.45 |
| 18 | 5 50 | 5.43 | 5.16 | 5.59 | 5.3 | 5.45 |
| 19 | 5.49 | 5.44 | 5.15 | 5.59 | 6.1 | 6.47 |
| 20 | 5.48 | 5.44 | 5.14 | 6.0 | 6.57 | 7.52 |
| 21 | 5.47 | 5.45 | 5.13 | 6.0 | 7.56 | 9.2 |
| 22 | 5.46 | 5.45 | 5.12 | 6.1 | 8.59 | 10.8 |
| 23 | 5.45 | 5.46 | 5.10 | 6.1 | 10.3 | 11.13 |
| 24 | 5.43 | 5.46 | 5.10 | 6.2 | 11.9 | ... |
| | | | | | | a.m. |
| 25 | 5.42 | 5.47 | 5.9 | 6.3 | ... | 12.14 |
| | | | | | a.m. | |
| 26 | 5.40 | 5.47 | 5.8 | 6 3 | 12.16 | 1.8 |
| 27 | 5.39 | 5.48 | 5.8 | 6.4 | 1.18 | 1.54 |
| 28 | 5.38 | 5.48 | 5.7 | 6.5 | 2.17 | 2.33 |
| 29 | 5.37 | 5.49 | 5.6 | 6.5 | 3.10 | 3.7 |
| 30 | 5.35 | 5.49 | 5.6 | 6.6 | 3.54 | 3.39 |
| 31 | | | 5.5 | 6.7 | | 4.10 |

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

## Phases of the Moon, Occultations, &c.

| | | | |
|---|---|---|---|
| 3 Sept. | ● New Moon | 9 | 47 p.m. |
| 11 „ | ☾ First Quarter | 8 | 47 a.m. |
| 19 „ | ○ Full Moon | 9 | 16 a.m. |
| 26 „ | ☽ Last Quarter | 12 | 7 a.m. |

Apogee, 13th Sept., at 5·18 a.m.
Perigee, 28th Sept., at 10.42 a.m.

The Moon will be passing from west to east of Jupiter on the 25th, at 9 a.m. They will then be well above the western horizon, a good deal (22 degrees) northward and it may be possible to detect Jupiter in the day time as its brightness has been increasing since March. A pair of binoculars will easily bring Jupiter into view in spite of the bright sunlight in the eastern side of the sky.

The apparent nearness of Venus and Neptune, especially on the 27th, will be less than the diameter of the Moon. The real distance between them will, however, amount to about 2,800 millions of miles. For ordinary observers the occasion is not exactly favourable, the planets being near the eastern horizon a short time before sunrise.

The Southern Cross will be on its side, like III on the clock-face about 8 p.m. on the 1st and about 6 p.m. on the 30th. It will be disappearing a few degrees west of south about 11 p.m. on the 1st and about 9 p.m. on the 30th. Aquarius will be rising at sunset on the 1st and Pisces on the 30th. The Great Square of Pegasus will be in the north-east at 8·30 p.m. in the middle of the month. The planets Venus and Jupiter which were, apparently, so near to one another in July, will be widely separated in September by a distance of over 100 degrees.

| | | | |
|---|---|---|---|
| 3 Oct. | ● New Moon | 8 | 19 a.m. |
| 11 „ | ☾ First Quarter | 4 | 5 a.m. |
| 18 „ | ○ Full Moon | 10 | 5 p.m. |
| 25 „ | ☽ Last Quarter | 6 | 21 p.m. |

Apogee, 11th October, at 12.42 a.m.
Perigee, 23rd October, at 8.0 a.m.

On the 5th Jupiter will appear to have reached its farthest eastern position in Taurus, about 7½ degrees beyond Aldebaran. It will then, apparently, be retracing its path westwards towards Aldebaran, which it will pass about 4½ degrees to the northward on 17th October.

Mercury will be passing from the east to the west side of the Sun on the 8th. On this occasion it will avoid a transit across the Sun's face by passing on the south side of the Sun, about three times the diameter of the Moon from it. Mercury will, therefore, be invisible until after the 15th, as it will rise an hour before the Sun only near the end of the month.

The proximity of Saturn to the Moon, as they rise together on the 9th, about half-past 9 in the morning, will be observable only with telescope or binoculars.

When the Moon rises, about 10 p.m. on the 22nd, Jupiter will be seen to be 4 degrees to the south-west of its darker edge.

On the 23rd, Mercury will reach its greatest distance, 18 degrees on the west side of the Sun, and will rise about one hour before the latter.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXII. 1 OCTOBER, 1929. PART 4.

## Event and Comment.

### The Utilisation of Sugar By-Products.

ONE of the most useful debates in the current Parliamentary session was the recent discussion on the profitable utilisation of all the products of sugar-cane, initiated by Mr. Swayne, the member for Mirani. Good service was done for our main agricultural industry by stimulating public interest in its economic possibilities other than the manufacture of sugar. At the Plane Creek Mill may be seen samples of building board made out of megass, and other commercial commodities, and its management is very keen on exploring the further possibilities of the industry and has collected a fund of information on the subject. As a base for stock food in which molasses and maize are prime ingredients the utility of dessicated megass has long been known, and it is claimed that a nutritious concentrated ration can be marketed at quite a reasonable price. Mr. Snowden's recent announcement in the House of Commons influenced Mr. Swayne in bringing the matter forward and his utterance was a timely one, for the British Chancellor in making clear his intention of removing all food duties mentioned sugar specifically, and with the removal of those duties all preferences must naturally go with them. As everybody already knows, if that intention is carried out it will affect very seriously all Dominion-grown sugar. Anticipating the situation likely to arise as a consequence, Parliament was asked to consider other ways in which the sugar industry may be safeguarded, and commercial utilisation of its other products offers some solution of the serious difficulty with which it may be faced. We have exported, since 1924, sugar to the value of £9,700,000, so it can be realised what the loss of that amount, or perhaps more, in the next five years would mean to the industry in this State and which even now is not as prosperous as many people seem to think. That nine or ten millions sterling as a factor in our trade

balance cannot be ignored either. Taking the long view we must consider every possible means of, if not improving, at least preserving the present conditions in the industry. Industrial alcohol, building board, and stock food—each of which has already been demonstrated commercially—provide at least three commodities on which attention might be concentrated to a much greater degree. The commercial possibilities of each are patent, and it is due to our own spirit of enterprise to explore those possibilities to the limit. Take motor spirit—Australia requires something like 200,000,000 gallons every year, and, if locally produced power alcohol can be diluted with it to the extent of 15 per cent., which is said to be the practicable limit, that would bring large quantities of molasses into industrial use. To convert it into power alcohol we would need at least thirty distilleries of the capacity of the present plant at Sarina. Our present output of molasses is, however, 17,000,000 gallons, of which nearly half is already required by distillers or for stock food. The rest, with the exception of about 3,000,000 gallons which is allowed to run to waste, is put to other more or less economic uses, such as for fuel and fertiliser. The questions raised by Mr. Swayne are: Can we utilise profitably more cane products for the production of motor spirit? Is it possible to profitably treat for the same purpose the sugar which we now export? It is all a matter of the same old thing, the cost of production, and that is obviously a subject for chemical and economical inquiry. The outstanding present facts are that from sugar products we can make commercially power alcohol, building board, and nutritious stock foods, and they at least constitute a basis for further research and possibly more profitable exploitation.

## Field Efficiency in Queensland.

AMONG recent visitors to Queensland was Mr. L. D. Larsen, of Kilauea Sugar Plantation, Hawaii. He has been making a general survey of the industry in the course of a four months' tour which took in Formosa, the Philippines and Java, and Queensland. His visit to Queensland he declared to be the most profitable, particularly on the economic side. Here the cost of production had made it necessary to use modern machinery and all sorts of labour-saving devices. The points in labour economy that impressed him most were the general practice of machine planting; the development of new and original cultivation; the use of machines for applying fertilisers; the development of machines for weeding in the cane row; and harvesting machines. He complimented Queensland canegrowers on their progressiveness and originality along those lines. Two of the implements he saw—the roto-cultivator and spinwheel-weeder—he regarded as distinctly original types. The cane-planter, a Queensland product, he said was decidedly simpler and more efficient than the machine occasionally used in Hawaii. Mr. Larsen also paid a high compliment to the Queensland canecutter and other field hands, who impressed him strongly as possessing a high degree of intelligence and interest in their job and the sugar industry as a whole.

He added—"Conditions in Queensland are unique in the sugar world on account of the high wages paid for field labour, and the use of white labour. However, I believe the situation is being met intelligently by employers as well as employees. I did not find the tendency on the part of labour to shirk and hold back the job that is evidenced in some other highly-organised labour communities. I studied men employed at task labour and at day labour, and believe their application and efficiency is decidedly superior to that of our labour in Hawaii or the other sugar countries visited. The relations between the plantation manager and his employees seemed decidedly pleasant in the cases I had opportunity to notice, and I believe the plantation managers are to be commended for the way they have met and adapted themselves to conditions of labour and to Government regulations that at best must be arduous and irritating. Impossible as these conditions seem to one accustomed to the use of coloured labour, they are taken in Queensland as part of the business, much as we in other countries look upon taxes and unfavourable weather."

## The Call of the North.

EVERY year there is a steady increase in the number of Southern visitors who follow the sun to the North and enjoy the geniality of Queensland's wonderful winter. One direct advantage to the sugar industry of their coming is that they are able to get personal impressions of its economic and social value to the Commonwealth. This winter many more distinguished people than usual joined in the annual migration, and it so happened that their advent synchronised with one of the periodical revivals of the Southern agitation against the sugar embargo. It is all to the good that they shall on their return—and there is already evidence that they will not remain silent on the subject—help to remove many of the misconceptions of the industry that cloud the minds of members of the Victorian Housewives' Association and other busy people below the Border and beyond the Murray. There is some truth in the suggestion of one visiting Federal Parliamentarian that more propaganda is necessary, especially among the consumers on the basic wage who are naturally susceptible to the publicity of opposing interests, and to whom the facts of the industry are not always adequately presented, if at all. The Town and Country Union of Victoria, which is apparently an association of uncompromising fiscal "wee-frees," is the latest body to enter the lists in the appeal to Southern prejudice, and though their efforts towards the removal of the embargo have been countered by the prompt answer of the Premier, Mr. Moore, their activities show the necessity of continual and ever-increasing vigilance on the part of cane-growing organisations and others concerned, and of constant and appropriate propaganda. Fortunately, the tourist attractions of North Queensland are bringing every year more people who count in legislative and commercial circles in the South, and their knowledge of the industry gained on the spot will add to their favourable influence in places where it is most needed.

## Empire Sugar.

PREFACING a recent report on the sugar position, the Chairman of the Empire Sugar Federation, Sir Benjamin Morgan, made a strong appeal for more consideration of the production of the Dominions and Colonies, which used principally British machinery and supplies of every description. The report shows that in 1928 Great Britain imported 215,323 tons of refined sugar from foreign countries and only 6,424 tons from Empire sources. The imports of unrefined sugar from foreign sources in that year amounted to 1,153,861 tons, as compared with 556,313 tons from British countries. Australia is already the largest producing unit in the British Empire with the exception of India, which is out of the reckoning as a supplier of the British market. The report states that Britain's position as a large buyer of sugar, and her almost solitary tendency to bow down to the doctrines of free import, has made her at once the object of hope to heavily protected foreign countries, and of anxiety to her own natural suppliers. Some realisation of the need to ensure an Empire supply of sugar, and thus to escape the very imminent danger of permanent high prices which foreign domination of the market would make inevitable, impelled the tentative preferences in the Budget of 1920, which have since been stabilised at a money value. It is now of the highest importance for the guaranteeing of supplies that the preference should be extended on a more ample scale. The Empire countries producing sugar may roughly be divided into three: the Dominions (Australia and South Africa), where the protected home market is satisfied before export; the dependent Colonies, where the whole of the production is exported; and India, the inadequate producer of less than 3,000,000 tons of inferior sugar and still an importer of the product of a plant indigenous within her borders. Leaving India necessarily aside, Britain must depend for her supplies on the Dominion and Colonial groups, and it is essential that there should be, between these three, entire agreement as to the policy which can best promote and increase production for the needs of this market.

Plate 127.—The Hon. Arthur E. Moore,
Premier of Queensland and a Noted Agriculturist.

# Bureau of Sugar Experiment Stations.

## CANE PEST COMBAT AND CONTROL.

*The Director of the Bureau of Sugar Experiment Stations has received from Mr. Edmund Jarvis, Entomologist, at Meringa, near Cairns, the following report for the period of August to September,* 1929:—

### Effect of Low Temperatures on Parasitic Insects.

Certain insects are able to resist excessive cold or heat better than others, although many species are killed when the thermometer registers several degrees below freezing point. The activities, for instance, of some species of locusts (grasshoppers) are greatly influenced by changes of temperature, such insects becoming practically dormant under conditions varying from 25 to 40 deg. Fahr., and succumbing to an exposure lasting about twelve hours to 17 deg. Fahr.

An exposure of only about ten minutes to a temperature of 130 deg. Fahr. has been proved to be equally fatal to grasshoppers, while, on the other hand, the greatest degree of activity in such orthopterous insects occurs between temperatures of 70 deg. and 100 deg. Fahr.

### High Temperatures Prove Fatal to Cane Beetles.

Our greyback cockchafer (*Lepidoderma albohirtum* Waterh.) is unable to survive maximum shade temperatures of 95 to 98 deg. Fahr., when such conditions chance to last for about thirty-six hours and are accompanied by a warm land breeze. Although resting by day in their feeding trees in a more or less shaded situation, these beetles, after enduring such heat for a few hours, become strangely agitated, and after vain endeavours to obtain cooler situations by congregating on the shady side of large tree trunks soon release their hold of the bark and tumble helplessly to the ground before expiring.

Reverting again to the effect of cold on species of the class Insecta, an interesting instance of this occurred at our Experiment Station at Meringa on 12th September in connection with the breeding of Tachinid flies, when the temperature registered by our outside minimum thermometer was found to be 38 deg. Fahr. It so happened that a consignment of these parasites was wanted that morning for an Innisfail grower, but at 7.30 a.m., when they should have been collected for transmission on the early train, nearly all of the specimens were seen lying motionless on the floorboards of the breeding cage. Most of the flies were on their backs, and although some were just able to feebly move a leg or two, others appeared upon first inspection to be dead. Such, however, was not the case, as when some of these latter were transferred to a warm place they soon made a complete recovery and became strong enough to take to wing as usual. By 10.30 a.m. (three hours later), after the sun had warmed the air somewhat, the majority of specimens were resting on the sides of the cage or on cane sticks. At 3 p.m. of the same day only four of these parasites could be found on the floor, two of them (males) being dead, while the other two appeared to be dying.

Judging by past weather records, the occurrence of 38 deg. Fahr. at about the middle of September is very unusual.

In 1923 and 1925, however, the lowest shade minimum temperature for that month was 37 deg. Fahr., while during 1925 the lowest shade minimum temperature for the four months (1st June to 30th September) was only 41.75 deg. Fahr., and the mean shade minimum 50 deg. Fahr.

In this connection it will be of interest to briefly consider the effect likely to be produced upon the economy of the Tachinid *Ceromasia sphenophori*, which at present is breeding in our canefields, this being a point that has not, so far as I am aware, been raised before. Under caged conditions such dipterous parasites were benumbed in the manner described above have only themselves to look to, but in the event of their being rendered helpless in this way and obliged to lie fully exposed upon the surface soil between cane rows they would certainly run a great risk of falling an easy prey to ants and other predaceous enemies.

In all probability, however, these parasitic flies ,when living under natural field conditions, might be able instinctively to sense the approach of exceptionally cold nights and accordingly seek to take advantage of well-sheltered places behind dry leaf-sheaths situated near the basal portions of cane sticks, where they would not have to face a chilling wind and would be afforded a chance of keeping away from the bare ground or exposed situations.

### Outbreak of "Army Worm" Caterpillars.

Early this month (September) an urgent 'phone message was received from the Tully district calling attention to an outbreak of *Cirphis unipuncta* Haw. on a plantation situated about two miles north of the mill. Prompt attention was accordingly taken to combat the ravages of this pest, and Mr. W. A. McDougall, who was sent to carry out this work, reported briefly as follows:—"The cane damaged is a mixture of first and second ratoon Badila. The caterpillars commenced operations near the scrub side of the farm, on the land, and advanced towards the higher land near the road. On Monday—*i.e.*, after a fortnight's feeding—the midribs only of about two and a-half acres of second ratoon were left. A band (just in front of attack) 5 to 8 yards wide across 200 to 250 yards was sprayed with lead arsenate."

During the five evenings preceding the day on which this spraying was done the owner had collected about half a kerosene tin full of caterpillars.

The strength of sprays used against various leaf-eating caterpillars and beetles is generally about 2 lb. in 50 gallons of water; but when considered necessary as much as 3 lb. of the arsenate can be safely employed to the 50 gallons without risk of injuring the leaves.

In the present instance ½ lb. lead arsenate in 9 gallons of water was found sufficient to do the work required.

The spray pump used was a Knapsack Auto Spray No. 1, of 3 gallons capacity, 12 feet high by 7 inches diameter, weighing about 7 lb., and costing approximately £3 15s.

This pump is constructed of brass, which will not corrode with strong solutions, and will last indefinitely, and is designed to discharge the spraying material under high compression. Particulars as to where these spray pumps can be obtained will be furnished on application to the Meringa Station or the Bureau of Sugar Experiment Stations, Brisbane.

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*The following extracts have been taken from a report (3rd September, 1929) to the Director of Sugar Experiment Station[illegible] H. T. Easterby) by Mr. Edmund Jarvis, Entomologist at Meringa, for the pe[illegible] July to August.*

### The Grub Problem.

By the beginning of August portions of the cane areas in the Mulgrave and Highleigh districts, which were believed to have escaped grub injury, had suddenly shown unmistakable evidence of attack. Several such cases were noticed by the Mulgrave Cane Inspector, Mr. M. J. Hoare, who attributes these belated signs of infestation to the occurrence of unusually favourable weather during June and July, which, he thinks, has enabled grub-affected stools to make enough additional root growth to keep the leaves from yellowing.

### Outlook for Next Season.

Without wishing to be unduly optimistic, it may be of interest to state that conditions up to the present point to a possibility of our grub pest receiving a climatological check next season. Such good fortune would certainly be very welcome in view of the chances that in the event of August to October proving favourable to the pupal and early beetle conditions in the soil, we may expect a more general and serious outbreak of this cane pest than that experienced last season (1928-29).

### The Present Position.

During the past few years I have not seen any reason to alter the opinion given in my annual report for 1924-25, regarding the most effective means of controlling the grubs of our "greyback" cockchafer (*Lepidoderma albohirtum* Waterh.).

After fifteen years of experience and considerable experimentation against the various life-cycle stages of this beetle, it appears that fumigation of grub-infested soil offers the best chance of ultimate control. At the same time we should not forget that the winged or beetle condition presents important possibilities in this direction; since, by collecting, trapping, or otherwise destroying these cockchafers through the fortnight preceding oviposition, it is possible to prevent deposition of the eggs.

The most promising of such remedial methods is probably that of luring great quantities of the beetles into suitable traps by the use of attractive aromas (see Bulletins Nos. 17, 18, 19, Division of Entomology). In future years, when the application of bio-chemistry to the chemotropic reaction of insects has been more deeply studied this fascinating phase of beetle control should prove an all powerful weapon in the hands of economic entomologists.

### Notes on Fumigation.

Just now, when there is much discussion as to the respective merits of paradichlorobenzene and carbon bisulphide as soil fumigants, it seems to me advisable to make it clear to our growers that the success obtained in other countries with the former chemical (paradichlor) against grubs of cockchafer beetles similar to our own greyback in habits, appearance, and general economy, must not—as some would have us believe—be attributed to the fact that it was obtained in some country other than Australia, and that this being so, such success could not be duplicated under the climatic conditions obtaining in Queensland.

Now, the efficiency of paradichlor. does not depend materially upon the nature of the soil, the flora, or the topography of any particular State or Kingdom in which it may happen to be used, but is influenced by temperature, moisture, and other factors. Similar conditions of temperature occur, of course, during some part of the year over areas of land situated in both the tropical and temperate zones; a fact which has made it possible to use this chemical successfully against subterranean grubs and insects in such widely separated countries as France, America, Queensland, and other intermediate lands. It should be needless to state that its toxic properties remain the same in any part of the world, despite erroneous impressions to the contrary apparently entertained by some cane farmers.

The fumes of paradichlor. are volatilised under temperatures of from 55 to 85 deg. Fahr.; the value and range of this fumigant being largely due and much enhanced by the possession of such wide and convenient latitude of volatility. We find, therefore, that satisfactory results can be secured with small doses (½ to ¼ oz.) of the crystalline nodules of this chemical over practically any terrestrial portion of the earth's surface, lying within an immense area embracing about 20 deg. north and 20 deg. south of the equator.

Regarding the use of this fumig... in temperate climates, it is usually during the warm months that injurious insects prove most troublesome, viz., at a time when the temperature of the ground becomes warm enough to ensure effective vapourisation of the crystals.

### Control Work against the Weevil Borer.

Early in the month (August) seventy specimens of the Tachinid fly were liberated by Mr. W. A. McDougall on borer-infested areas in the South Johnstone district, where a brief inspection was also made with a view to the discovery of any other insect pests of cane.

It is interesting to record that abundant evidence was found of the establishment of this useful fly parasite amongst cane at the South Johnstone Sugar Experiment Station. Mr. McDougall also noticed that on the various farms visited the poor or unhealthy canes seemed to be the ones most damaged by weevil-borers, and that sticks with spindle top were all heavily infested by this insect.

Growers troubled with "Army Worms" should use an arsenate of lead spray, and are advised to consult the Monthly Hints published in the September numbers of the "Queensland Agricultural Journal" and the "Australian Sugar Journal."

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## ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

By EDMUND JARVIS.

### "Glossy Scrub-Chafer" Emerging.

The dark-purplish or brownish-red beetle, which during normal seasons usually appears on the wing in September and October, is noticeably larger than French's cane-beetle, which is lighter in colour, more slender, and does not fly until a month or two later. The former cockchafer, as its common name implies, occurs chiefly in canefields situated close to, or in the immediate vicinity of, scrub lands, being plentiful at times near Babinda and on farms lying near the foot of the Bellenden-Ker ranges and other mountainous land supporting a dense scrub vegetation.

The grubs of this chafer beetle (*Lepidiota caudata*) are often responsible for damage to cane roots believed by farmers to have been caused by grubs of the commoner "greyback" beetle. Such a mistake is not to be wondered at, seeing that the larvæ of both these species resemble each other very closely in size and general appearance. As a rule, the "glossy scrub-chafer" does not cause serious injury to cane.

**"Forewarned is Forearmed."**

Growers are again reminded that now is the time to prepare for fighting such insect pests as may chance to make their appearance later on in the warm weather. The purchase of a good spray-pump would never be regretted, and no up-to-date cane farm should be without so useful an appliance, since for an initial outlay of less than £5 a grower can obtain, ready to hand for immediate use if required, the means of saving his young cane from being destroyed or seriously checked in growth by such insects as army worms, grass caterpillars, plant-eating beetles, locusts, or aphides, &c., all of which occasionally devour or damage leaves of sugar-cane. The Auto Spray Pump No. 3A is well adapted for use on most cane farms. This pump has an 8-gallon brass tank, and is equipped with a powerful agitator, 8 feet of high-pressure hose, 8 feet of iron extensions, and a Vermorel nozzle. It is moved about in the field by means of a broad-tyred wheel, and is fitted with iron handles, while the stray is delivered under high pressure.

The agents for these Auto Spray Pumps are Buzacott and Company, Limited, of Adelaide street, Brisbane.

Do not forget to have a few pounds of lead arsenate paste always on hand. This can be procured from Taylor and Elliott Limited, of Charlotte street, Brisbane, in stoneware jars holding 1 lb., costing about 2s. It is a good plan to cover the top of the cork of such jars with a layer of sealing wax, as then the paste will remain moist for years. A pound or two of Paris green should also be purchased as a stand-by, in case it should become necessary at any time to lay down poison bait for cutworms or other caterpillar pests.

Supplies of paradichlorobenzene or carbon bisulphide for fumigating grub-infested soil should be ordered without further delay by communicating with the various secretaries of pest destruction funds, from whom all information regarding such soil fumigants can be obtained at any time.

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## BULLETIN NO. 2.

### A KEY FOR THE FIELD IDENTIFICATION OF SUGAR-CANE DISEASES.

This Bulletin, by Mr. Arthur F. Bell, the Pathologist to the Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, has been the subject of favourable comment from sugar-cane countries in all parts of the world. Amongst many letters received by the Bureau the following may be quoted:—

Dr. Lyon, Consulting Pathologist, Experiment Station, Hawaii, says—

> "I wish to thank you most sincerely for copy of Bulletin. It is well arranged, very concise and accurate, and certainly constitutes the best manual of the diseases of sugar-cane now in existence."

Dr. H. V. Koningsberger, Director, Department of Agriculture, Sugar Experiment Station, Java, says—

> "I have been very much impressed by reading the recent Bulletin by Mr. Bell, and I want to congratulate you on the important papers published by your Bureau. Mr. Bell especially deserves the gratitude of all canegrowing countries for this valuable 'key.'"

Dr. E. W. Brandes, Principal Pathologist in Charge, Sugar-cane Plants, United States Department of Agriculture, says—

> "Without any question this is the most up-to-date and valuable summary of cane diseases that has yet appeared, and will be of service to the sugar-cane industry everywhere."

# HINTS TO SOUTHERN CANEGROWERS.

*The Director of the Bureau of Sugar Experiment Stations has received the following Hints to Canegrowers (Southern Districts) from the Assistant Entomologist Bundaberg Sugar Experiment Station, Mr. R. W. Mungomery:—*

## Clean Up when Ratooning.

In most cases it is customary for growers, after having cut their cane green, to leave the trash for a week or more to dry thoroughly and then to fire it. In this way thousands of eggs of leaf hoppers and moths, &c., are destroyed, which if left would have been potential sources of trouble to the young ratoons, and the field is left in a thoroughly clean condition as far as surface pests are concerned. By the term surface pests this is meant to embrace all those pests that attack the cane plant above the surface of the ground.

## Do not leave Trash on Ratoons.

Instead of burning, some growers follow the practice of leaving the trash to rot on the surface of the ground, and allow the cane to volunteer through. From the viewpoint of pests, this is often a harbour and encouragement for them, since certain moths show a decided preference for laying their eggs in such situations, with the result that when the caterpillars hatch from these eggs they straightway commence to feed on the young cane.

The futility of such a practice has often been seen, but especially was this noticeable on a farm that was under observation last year. Part of the trash on a harvested field was burnt, whilst another portion of the same field was left with the trash saved, and it was rather remarkable that the cane in the burnt portion was undamaged at the same time when the volunteer ratoons were almost stripped of leaves by army worms. Such crops affected by army worms usually recover, but it is absolutely unnecessary to subject them to these severe checks when weather conditions in the spring are often so unfavourable for vigorous growth.

## Where Caterpillars Develop.

As stated above, certain moths instinctively lay their eggs in places where the resulting caterpillars find excellent conditions for their development, and in this respect trash left on young ratoons provides them with conditions almost approaching ideal. Briefly the habits of these insects are as follows:—The young caterpillars on hatching from the eggs commence to feed on the young green cane leaves. This feeding is more general during the night time, and when daylight appears they retire under the trash and other debris or, as frequently happens, they crawl between the curled leaves of the central spindle. In this way they effectively conceal themselves, only the jagged edges of the leaves and a few pellets of grass betraying their presence, and they remain out of sight from insectivorous birds which would otherwise make a meal of them and help to keep them in check. However, they go on feeding in this manner, and when they are a little more than half-grown their food requirements increase enormously. If they are in large numbers they cause great damage to the young cane, often stripping the shoots quite bare, and when their food-plants become scarce they often migrate in search of more, and this habit of travelling en masse has earned for them the name of army worms.

During this season, when much cane has been burnt on account of the damage by frost, the amount of trash remaining on the ground will probably be not so great as in former years, but, at the same time, growers will be well advised to rake up and burn all waste material such as partly-burnt cane tops which lie scattered about the fields, for, as previously pointed out, pests seek shelter under this débris.

## When to Conserve Trash.

The above warnings concerning the danger of volunteer ratoons is not meant to discourage the practice of trash conservation, which practice in some of our drier areas has much to commend it. Trash conservation, however, is usually done in connection with the last crop of cane harvested, and the cane is cut green, the cane later ploughed out, and the trash ploughed under. In general, as far as surface insects affecting cane are concerned, this practice has in many cases the same ultimate effect as the system of burning. By turning the trash under, many eggs

are buried, and if the young larvæ succeed in hatching out, they are unable to penetrate through the thick covering of soil and they soon die. If the few that are not completely covered with soil succeed in hatching out, they find that there is none of their food-plant growing near at hand, and since these tiny caterpillars cannot migrate without food to any great distances they likewise perish unless they happen to find an isolated green shoot. In any case, the number that would actually survive under such conditions represents a very small proportion of the total number of eggs deposited, and therefore the system is quite sound in so far as the destruction of army worms and similar pests is concerned.

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## CANE PESTS AND DISEASES.

*The Assistant Entomologist at the Mackay Sugar Experiment Station has submitted to the Director of the Bureau of Sugar Experiment Stations the following report for the month ended 12th September,* 1929:—

### Pupae of Greyback Beetle (*Lepidoderma albohirtum* Waterh.) and other Small Scarabaeid Grubs.

Following a request made by a grower at Sarina, who was preparing ground for planting, an inspection was carried out on his farm, and it was found that numbers of pupae of the greyback beetle and a great many small scarabaeid grubs were being ploughed up.

The chief object was to determine the identity of the latter, as the grower intended planting cane in the block that he was ploughing, and the presence of large numbers of small grubs naturally caused him anxiety as to whether it would be wise to plant there or not. These small grubs, which were less than ¾ inch in length in the curved position, were very numerous amongst the roots of old stools, but they had apparently not caused any injury to the roots. They were in the third stage, so would very possibly pupate either this month or next, therefore planting would be quite safe in any case.

They were identified as belonging to either the genus Heteronyx or Haplonycha; the grubs of beetles belonging to these genera are grass root or humus feeders, and have so far not been recorded from sugar-cane roots. Grubs of these genera are frequently very plentiful in grass paddocks, where they subsist on very fine grass roots and soil. They usually feed only a couple of inches below the surface.

The greyback pupae that were ploughed up were all situated at depths varying from about 6 inches to 1 foot or more; the ground was loose and fairly moist, and the ploughing was very deep. All the pupae examined were well advanced, and from appearances the beetles would be fully developed before the end of this month. That does not necessarily mean that they will emerge from the ground immediately after emergence from the pupal shells; they will remain in their old pupal cells for several weeks for their bodies to harden, also for the advent of warmer weather combined with good soaking rains.

If the first good rains of early summer should fall at the latter part of October or early in November, in all probability the beetle flight will be early this summer—that is, judging by the advanced state of the pupae at the present time. On the other hand, if the dry weather should continue for a further two months or more, the ground may become so hard and consolidated that many of these beetles may be unable to leave their cells and therefore perish in them.

Growers who were troubled with grubs during the past season will be well advised to clear away from the immediate vicinities of their canelands all feeding trees of the beetles, more particularly those growing on the windward side of the cane. Many farmers desire to leave a few of these trees from which to collect the beetles; if any are left for this purpose, they should be small trees which are easily shaken, and even then it is not advisable to leave any that are close to cane. Much tall grass growing near cane at the flighting time of the beetles is also bad, as it serves to attract them to that particular area. They appear to be invariably attracted to the highest cane or grass, and even though the grass may be taller than the young cane and be the source of attraction, yet the grass itself may not be subsequently attacked by grubs whilst the cane suffers. This is due to the fact that grassy headlands are usually uncultivated and the ground is hard and consolidated, which deters the beetles from entering to lay their eggs, consequently they may enter the cultivated ground where the cane is growing, and thus grubs will later attack the cane.

**Occurrence of Unknown Beetle Larvae amongst Cane Roots (*Lampyridae* sp.).**

Following on inquiry made by a farmer at Pinnacle, who had ploughed up great numbers of small active yellowish grubs whilst ratooning, a visit was subsequently paid to the farm in question to ascertain whether the grubs under notice were causing injury to the cane roots or not.

Inspection revealed the presence of these grubs in almost countless numbers, each one being enclosed within a small oval cell. This would appear to indicate that they had ceased feeding and were preparing to pupate. Several stools were dug up and the earth removed from amongst the roots, but there were no signs whatever indicating that the roots had been damaged.

A similar occurrence of small beetle larvae (and very probably the same species as this will prove to be) occurring very plentifully amongst cane stools was brought under notice by Mr. G. Bates (Assistant Entomologist) several years ago from a farm in the Proserpine district. They were identified when bred through to the beetle stage as *Telephorus* sp., one of the "Soldier Beetles."

The beetles belonging to this family are all more or less elongate insects which fly freely during the daytime, usually amongst timbered country. They have a rather soft integument, not hard and chitinous as in cane beetles, and they are usually some shade of black, dark olive, and brown. In many species of the family the antennae or feelers are long and pectinate or semi-pectinate (feathery).

The usual food of their grubs is recorded as being variable, but many forms are carnivorous or predatory, with a tendency towards cannibalism. There is no doubt, therefore, that cane roots are quite immune from their attacks.

Should any other growers note the occurrence of such like larvæ amongst their cane during ratooning or ploughing operations, it may be well to give a brief description of these larvae in order to avoid undue concern.

The colour, including the head, is creamy yellow; body soft and tapering towards both extremities; segments very clearly defined; length, including head, 19-20 millimetres (about 8/10ths inch). The whole body and even the head is slightly flattened. On each of the first, second, and third segments ventrally is a pair of rather large legs, which are the same colour as the body. These grubs are able to move fairly rapidly when dug or ploughed up, but if touched will curl themselves up and remain motionless until the danger is passed.

The disturbing of the ground during cultural operations would tend to be responsible for the destruction of many of these larvae, because on the farm inspected many were being attacked and eaten by two different species of ants—namely, the common "Green Head" (*Chalcoponera metallica* Sm.) and the introduced small brown ant (*Pheidole megacephala*). The latter species has major and minor forms of the worker, the first form have enormous heads which are quite out of all proportion to the sizes of their bodies; these are particularly destructive to other insects.

**Wallabies and Cane.**

During recent inspections made in the Habana district indications of damage to cane by wallabies were noted in several blocks of plant cane; in one instance the damage was fairly severe. This particular patch of cane was bordered on two sides by open forest land, the fences on those sides being a considerable distance from the cane.

Damage by these animals may occur to either young or mature cane; in the latter case it may be fairly readily distinguished from rat injury, which it resembles by the gnawings into the sticks being uniformly higher from the ground, whereas rat injury is usually more irregular. Sometimes in canefields the "playgrounds" of these animals may be seen, quite a cleared space with the ground almost bare, in amongst the cane.

Wallabies appear to attack cane more readily during dry weather than at other times of the year, no doubt owing to the scarcity of native grasses, &c., during the dry season.

*THE JOURNAL APPRECIATED.*

*A Carbeen farmer writes (3rd September, 1929):—". . . We much appreciate your good efforts for the betterment of the man on the land through the 'Queensland Agricultural Journal.'"*

## QUEENSLAND SUGAR-CANE SOILS.

*Report on Queensland Sugar-cane Soils, Planting, and Tillage, prepared for the Committee of the International Society of Sugar-cane Technologists by the Bureau of Sugar Experiment Stations.*

Owing to the larger part of the cane soils of Queensland being alluvial in character, there is some difficulty in recognising soil types.

In the Cairns district the alluvial soils of the Mossman, Hambledon, and Mulgrave areas may be classed together. They vary in colour from light grey to dark red, but do not show very marked analytical differences. They all belong to the Permo-Carboniferous age.

The following is an analysis of a composite sample from these areas:—

| | |
|---|---|
| Moisture | 1.72 |
| Volatile matter | 6.03 |
| Insol. residue | 74.65 |
| Chlorine | 0.003 |
| Phosphoric acid | 0.14 |
| Iron oxide | 4.12 |
| Aluminium oxide | 8.94 |
| Lime | 0.27 |
| Magnesium oxide | 0.43 |
| Potash | 0.48 |
| Soda | 0.18 |

| Soluble in 1 per cent. citric acid— | Per cent. |
|---|---|
| Phosphoric acid | 0.0037 |
| Lime | 0.0843 |
| Potash | 0.0142 |

The high percentage of magnesia in comparison to lime is typical of these soils.

The alluvial soils of Innisfail and Mourilyan show great similarity in analyses, except that the former has better $P_2O_5$ content. Geological age undetermined.

Soils from the Halifax, Ripple Creek, and Ingham sub-districts belong to the Recent and Post Tertiary geological age. They analyse somewhat similar to those from Innisfail and Mourilyan, but have a much lower iron and aluminium content.

The Mulgrave and Innisfail red soils are of volcanic origin and are termed "Bastard Red Soils" owing to their indefinite nature. The former, as will be seen from the average analyses, are a much better type.

Mulgrave (Red).

| | |
|---|---|
| Moisture | 1.98 |
| Insol. residue | 70.43 |
| Volatile matter | 7.15 |
| Phosphoric acid | 0.22 |
| Chlorine | 0.002 |
| Iron oxide | 7.18 |
| Aluminium oxide | 12.13 |
| Lime | 0.32 |
| Magnesium oxide | 0.34 |
| Potash | 0.40 |
| Soda | 0.17 |

Innisfail (Red).

| | |
|---|---|
| Moisture | 4.23 |
| Insol. residue | 42.05 |
| Volatile matter | 15.78 |
| Phosphoric acid | 0.27 |
| Chlorine | 0.005 |
| Iron oxide | 16.52 |
| Aluminium oxide | 20.47 |
| Lime | 0.08 |
| Magnesium oxide | 0.20 |
| Potash | 0.17 |
| Soda | 0.20 |

In the Mackay or Central District, with the exception of Farleigh soils, all are of Recent and Post Tertiary geological age, and all are alluvial.

Farleigh area falls in the Lower Bowen (Freshwater-Marine-Volcanic) series of Permo-Carboniferous age.

In comparison with the Northern or Cairns division, the greater content of CaO and the excess of CaO to MgO is very noticeable. As will be seen from the analysis of composite samples from the Mackay and Proserpine areas and the average of Burdekin soils, very little difference is evident over a wide area:—

MACKAY AND PROSERPINE.

| | |
|---|---|
| Moisture | 2.35 |
| Volatile matter | 6.76 |
| Insol. residue | 79.01 |
| Chlorine | 0.004 |
| Phosphoric acid | 0.17 |
| Iron oxide | 3.97 |
| Aluminium oxide | 5.93 |
| Lime | 0.75 |
| Magnesium oxide | 0.52 |
| Potash | 0.20 |
| Soda | 0.21 |

BURDEKIN.

| | |
|---|---|
| Moisture | 2.33 |
| Volatile matter | 6.14 |
| Insol. residue | 80.44 |
| Chlorine | 0.004 |
| Phosphoric acid | 0.19 |
| Iron oxide | 3.41 |
| Aluminium oxide | 5.17 |
| Lime | 0.96 |
| Magnesium oxide | 0.73 |
| Potash | 0.35 |
| Soda | 0.14 |

With regard to the Bundaberg or Southern division, the soils immediately around Bundaberg are of Basaltic origin.

## Planting.

Only minor differences exist in planting, the methods being practically the same throughout. Less cane is used per acre in the Southern or subtropical cane areas.

Fowler steam ploughs are used on a few plantations, but as the greater part of the cane is grown by small farmers in Queensland, whose average acreage under cane is 36, the bulk of preparation is done by tractor and horse tillage. The tractors principally used are the Fordson, McCormack, Deering, Hart Parr, Holt, Ruston Hornsby, Cletrac, Renault, Fiat, Twin City, Austin, and British Wallis.

Planting is done on well-prepared cultivable land, three to four ploughings in drills varying from 4 feet 6 inches for thin erect canes to 6 feet for thicker canes. Space between plants varies from continuous planting (very little of this is done) to 18 inches apart. The greater part of the cane planting is in 5-feet rows and 6 inches apart. Practically the whole of the cane is used cut up into three or four eye plants, in furrows or drills about 10 inches deep.

In many districts a cane planting machine is used. Cane plants receive about 2 inches of covering where soil is moist, and 3 to 4 inches were dry.

In what is known as new scrub land the cane plants are deposited in holes. The holes are usually made 14 by 9 by 9 inches. The number of holes varies from 2,500 to 3,000 per acre.

Planting in the subtropical areas is usually done from December to April and from August to October. The first period is known as "early" planting and the second as "late." In the north (tropical) areas cane planting is carried out as "early" in March and April and "late" in July to October.

Tillage is generally done with shallow cultivating implements, such as the Planet Junior or else with a Cotton King disc harrow—mostly horse drawn, though

some implements are tractor drawn. In wet areas, ploughs are often used to plough away and plough to the young cane where a heavy growth of weeds has taken place, but this practice is not regarded with favour.

In the subtropical districts, up to third ratoons are frequently grown; in the Central district, up to second ratoons; and in the North, generally only one ratoon is grown. Trash is generally burnt, and after this is done the following methods are practised:—

(*a*) Trash burnt and four furrows to 9 inches ploughed between cane rows. Land levelled down by use of tyne harrows or cultivator.

(*b*) Trash burnt, procedure same as above, but only three furrows ploughed between rows.

(*c*) Trash burnt and ground cut up first with disc harrows crossways. Then use of plough between rows followed by tyne harrows crossways.

(*d*) Trash burnt, four furrows ploughed between rows and skeleton plough used in furrows next to cane.

(*e*) Trash burnt and land treated with spring-tooth cultivator or a grubber instead of being ploughed.

(*f*) Trash left and rolled in each alternate interspace. Every other interspace well cultivated with the plough. In this way each row of cane has one side cultivated, and one side uncultivated but covered with trash.

(*g*) Trash left and cane allowed to volunteer without any cultivation at all. This method is sometimes advantageous in a droughty season, but is not to be recommended as a regular thing.

(*h*) Thoroughly stirring the land between the cane stools to a depth of 16 inches with the plough and sub-soiler.

All these methods are in use, or some variation of them. In the writer's opinion the best cultivated ratoons (other things being equal) give the highest yields, but it is often a question of cost.

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Plate 128.—Blowing Machine for Spreading Insecticides over Cane Fields under Trial in Java.

# COB ROT OF MAIZE.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

Cob rot of maize is a general complaint in the maizegrowing areas of the United States of America and South Africa. It was reported from Australia in 1918 by Dr. Darnell Smith, who stated that it was a serious disease which appeared to be spreading. Henry Tryon recorded the disease in Southern Queensland in 1919, and then in 1925 wrote of it as seriously affecting the quality of maize throughout the Atherton Tableland with, in places, a heavy percentage of damaged cobs. During the past season cob rot has appeared in a number of centres in the South as well as on the Tableland, and as many of the growers are unfamiliar with the nature of this disease a short description of it is given below.

## Symptoms.

The cobs which are badly affected with the rot can be distinguished externally by their light weight and by a feeling of compactness. The husks tend to cling together and are more difficult to remove. The disease is caused by a fungus, the presence of which can usually be readily discerned on removing the husks. It appears as a light grey mould like growth lying between and around the grains and sometimes extending to the husks, which may become firmly matted together. (Plate 129.) The mould is commonly more abundant at one or the other end of the cob corresponding to the region first invaded. In most cases, except those of light infection, the grains are discoloured, often of a duller appearance, and their contents are of a more crumbly nature.

## Cause.

Cob rot can be brought about by several fungi, of which the most serious causal agent, both in Queensland and elsewhere, is *Diplodia zeae* Lév., which is the one discussed in these notes. A second parasitic fungus—*Fusarium moniliforme* Sheld.—is also a cause of cob rot in Queensland. This form can usually, but not always, be distinguished by a pink tinge given to the affected portion of the cob. Saprophytic fungi—*i.e.*, fungi which live on dead and rotting matter, are often found associated with cob rot when the cobs are exposed to the entrance of such organisms by the previous attack of corn ear worm or by excessively wet conditions.

The fungus *Diplodia zeae* is able to grow on all parts of the maize plant. Under the ground it can cause a root rot condition. On leaves and stem it produces reddish or purple spots. On the cobs it gives the symptoms noted above. The mould growth mentioned consists of a mass of fine interlaced threads of mycelium of the fungus. The vegetative stage in the life history of the fungus is followed when conditions are suitable by the reproductive stage. This appears to the naked eye as small black dots which, under the microscope, are seen to be hollow globular receptacles, known scientifically as pycnidia, containing numerous minute brown two-celled spores. (Plates 130 and 131.)* These spores are blown about by the wind and frequently lodge between the leaf sheath and stem or on the shank or tip of the cob of a maize plant. In these situations they often find sufficient moisture to germinate, and on doing so infect the plant. The effect on the stalk and leaves is rarely of a serious nature, but on the cob all stages from barely perceptible infection to complete destruction may result.

* Plate 131 is reproduced from Henry Tryon's "Ear Rot of Maize" and represents drawings of material prepared by that author.

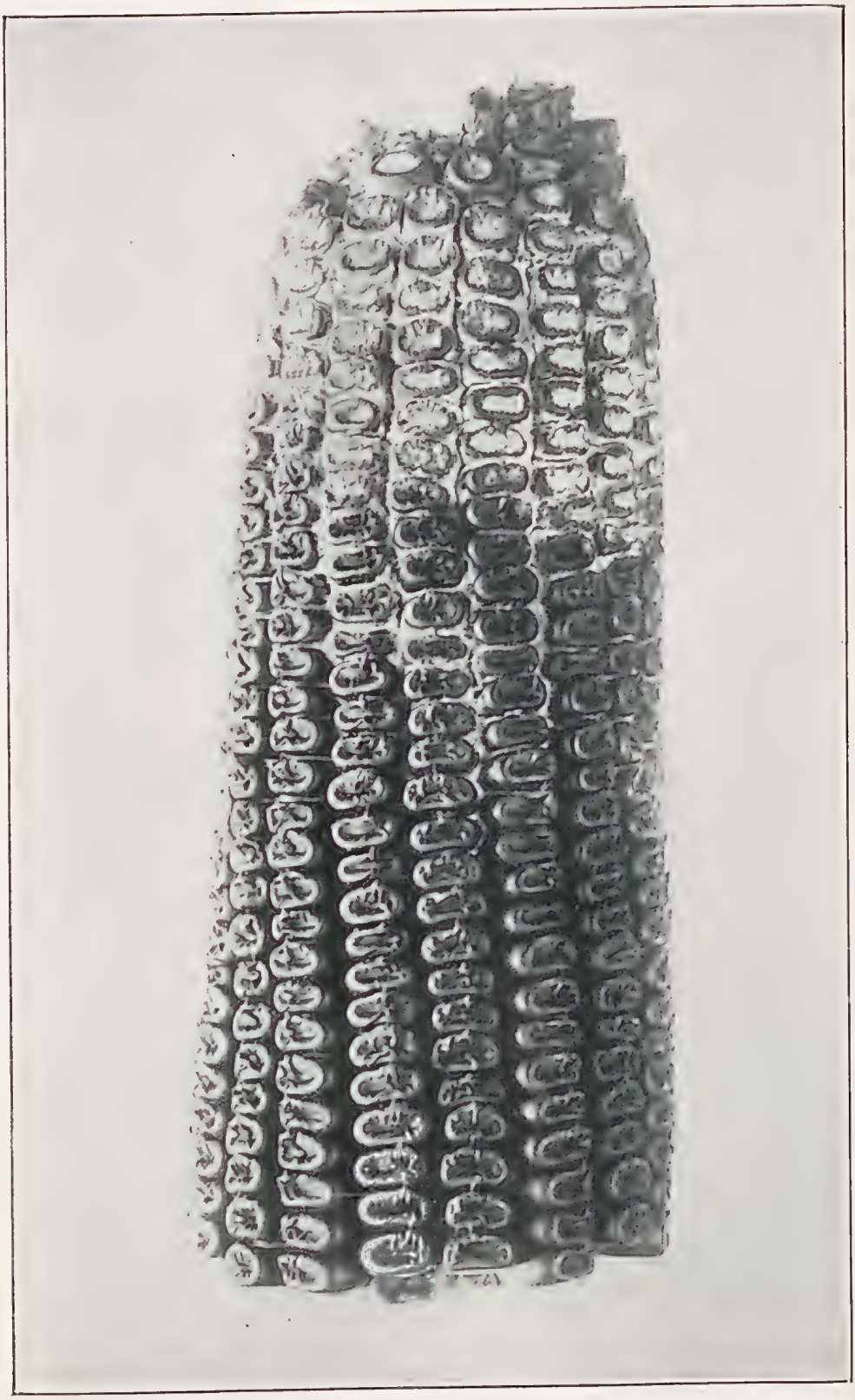

Plate 129.—Cob Rot of Maize—*Diplodia zeae.*
Showing mould arising from infection at the tip of the cob.

Plate 130.—Cob Rot of Maize—*Diplodia zeae.*
Pycnidia of the fungus on the husks of an affected cob (slightly enlarged).

The point of infection is usually one or other end of the cob, and from there the fungus spreads between the grains and also penetrating them breaks down their contents to a soft, crumbly mass. If conditions are sufficiently moist the small black pycnidia appear on the mycelium at the base of the grain. They are also produced on the husks, the core of the cob, and on the leaves and stem. (Plate 130.)

### Source of Infection.

The most serious source of infection is the quantity of old broken stalks, &c., remaining in the ground from a previously affected crop. It has been shown that maize grown on land which has not been cropped to maize for three years and which is isolated from sources of wind-borne infection from neighbouring crops does not usually develop the cob rot symptoms.

Seed from a diseased crop is often dead as a result of the fungus invasion and fails to germinate. It may, however, if lightly infected, produce weak seedlings which grow into stunted plants often affected with root rot. As the fungus grows inside the seed, treatment with bluestone or fungicidal dusts does not eradicate it. Hence it is necessary to obtain seed which is not infected. This cannot be done with certainty by taking apparently good cobs from a field in which the disease is present. One method of making certain that a cob is fit for seed is to take grains from various parts of it and germinate them. Only cobs whose seeds produce clean, strong seedlings can be pronounced free. The best plan is to obtain seed from a crop in which careful examination has failed to show the presence of cob rot.

### Contributing Conditions.

The disease develops to a greater extent under warm, moist conditions. This means that other things being equal it will be worse with the moister conditions obtaining in a thick crop than in one which is thinner. Also, under good weather conditions in which the crop dries off rapidly after reaching maturity, the fungus does not get the opportunity to do so much damage as it otherwise would. Further, if the crop is taken off and placed in shelter as soon as it is mature and quite dry, the possibility of it again getting wet and thereby allowing the fungus to spread further will be prevented.

### Control.

The following control measures for the disease are recommended:—

(1) Burn all remains of the crop after harvesting. In order to minimise the spread of the fungus this should be carried out as early as practicable.
(2) Rotate maize land with other crops.
(3) Use sound seed preferably selected from a crop which is known to be free from the disease.
(4) Harvest the crop as soon as it is dry.

It is inadvisable to use damaged grain as fodder. Experiments conducted in South Africa have shown that maize containing *Diplodia zeae* when ingested in considerable quantities is poisonous to cattle and sheep. With respect to horses and pigs, the matter is still in doubt, though it can be taken that there is no cause for alarm over the consumption of a small amount along with wholesome food. Owing to the possibility of the spores passing through an animal uninjured, the feeding of diseased material may help to spread the disease, and is also on that account better avoided.

Fig 1

Fig. 2.

Fig 3

Fig 4

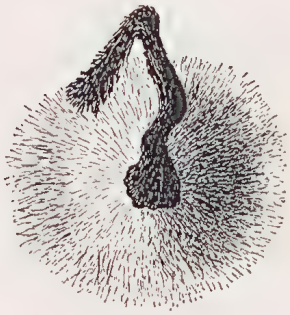

Fig 5

Fig 6a

Fig 7

Fig 6.

Fig 8

PLATE 131.—DIPLODIA ZEAE.

A. Infective agent: Fig. 1, Spores. B. Vegetative growth: Fig. 2, Mycelial threads; Fig. 3, Mycelium traversing tissue cells of husk; Fig. 4, Mycelium in tissue of seed germ. C. Reproductive growth: Fig. 5, Surface view of pycnidium extruding spore filament; Figs. 6 and 7, Longitudinal section of pycnidia in position; Fig. 6a, Enlarged view of inner wall of pycnidium, showing spore formation; Fig. 8, Spore germination and formation of germ tube. (All highly magnified).

# DISEASES OF PINEAPPLES.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

The pathological problems to which reference will now be made are the following:—Wilt, base rot, Thielaviopsis fruit rot, fruitlet core rot, top rot, and tangle root. Before discussing these problems a brief reference must, however, be made to certain features in the growth habits of the pineapple.

The pineapple belongs to a family of plants many of whose members live on trees and rocks, where they have become adapted to more or less of an air-dwelling habit. Although itself a soil-inhabiting species, the pineapple resembles these plants to a certain extent in structural features, and possibly as a correlated character exhibits a marked intolerance of conditions leading to bad soil aeration.

The pineapple is also a heavy feeder, and judicious fertilising is necessary on any but good soils. Poor drainage and lack of the necessary soil nutriments constitute the primary cause for much of the so-called disease met with in Queensland. There are, however, several specific diseases of a parasitic nature which will be found included below.

## Wilt.

The presence of pineapple wilt in a field is indicated by the appearance of certain areas in which the plants exhibit a general unthrifty condition, together with a stunting of the plants and any fruit which may be produced. The leaves assume a reddish-yellow colouration in marked contrast to the normal healthy green. They commence to turn brown and dry out from the tip, giving rise to the appearance suggesting the common name of wilt. Examination of the affected plants will show that, corresponding to the outward manifestations of disease, the root system will present various stages of decay. Even before external symptoms become visible the younger rootlets may be found to have perished.

### Cause.

This disease was investigated and reported on by Tryon as early as 1893. A further full account of these researches was published in the "Queensland Agricultural Journal," vol. xv., 1904. Tryon found that there was a definite fungus associated with the decay of the roots. This organism, however, was unable to infect plants unless they were previously subjected to some unfavourable growing conditions which impaired their vitality. He was able to show, by extensive field observations and by the elimination of other possible factors, that the contributing condition was to be found in the nature of the soil and its drainage. Wilt makes its appearance when the crop is grown on soil of shallow depth with a stiff subsoil. The pineapple is a plant which is able to grow well under quite moist conditions, provided drainage is adequate, but it is unable to resist the ill-effects of standing water.

From a consideration of the past history of the disease it was shown that a contributing cause was the occurrence of periods of unusually cold weather at the time when the plants were subjected to heavy rainfall.

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables" by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

### Control.

In order to avoid having trouble of this nature, growers should not plant on shallow, poorly drained land. If for any reason such land has to be used, a system of artificial drainage will be found beneficial.

On poor land "wilt" symptoms may also arise as the result of some deficiency in plant food. The remedy for this would naturally lie in improving the growing conditions by judicious manuring.

## Base Rot.

There are two characteristic diseases induced in the pineapple by the fungus *Thielaviopsis paradoxa*. One is the decay of the stem known as base rot, the other is a soft rot of the fruit which will be dealt with subsequently.

### Symptoms.

Pineapple suckers sometimes fail to develop normally after planting out. Such plants remain more or less at a standstill and cease to produce new growth. Later a yellowing and withering of the leaves commences and the sucker eventually dies. The plants exhibiting these symptoms will be found to be loose in the ground, and closer examination will disclose a black area of rot invading the base of the stem. (Plate 132, fig 1.) The rot gradually extends until the whole of the lower part of the sucker, together with some of the lower leaf-bases, may be involved. The plant is then liable to break off at ground-level.

Older plants are sometimes affected with this trouble, the symptoms being very similar to those described above.

A loss of as many as 80 per cent. of the suckers from one planting has been reported during a wet season. The average is, however, considerably less than this.

### Cause.

This rot is caused by a fungus (*Thielaviopsis paradoxa*) which may infect the plant through wounds, or under favourable conditions even through the uninjured surface. Within the invaded area there is set up a soft rot which is at first brown but later changes to an almost sooty black colour owing to the development, from the fungal threads or mycelium within the tissue, of very numerous dark-brown oval spores. These spores are liberated by the complete decay of the affected part and then serve to further spread the disease.

### Control.

1. After pulling, and if necessary stripping the suckers ready for planting, dry in the sun for a few days.

2. Avoid planting during very wet weather.

3. As a further precaution the stripped suckers may be dipped in strong Bordeaux mixture before drying. Dipping alone cannot be relied on to give satisfactory control.

4. All diseased suckers, &c., should be removed and burnt. Otherwise the spores of which the rotting tissue is full will be liberated into the soil, where they will be available to produce further infection in new plants.

## Thielaviopsis Fruit Rot.

The same fungus (*Thielaviopsis paradoxa*) as that implicated in base rot is the cause of a rot of the ripening fruit, especially when this has become bruised or otherwise injured by rough handling. On the

Fig. 1.—Base Rot of Pineapple Suckers.

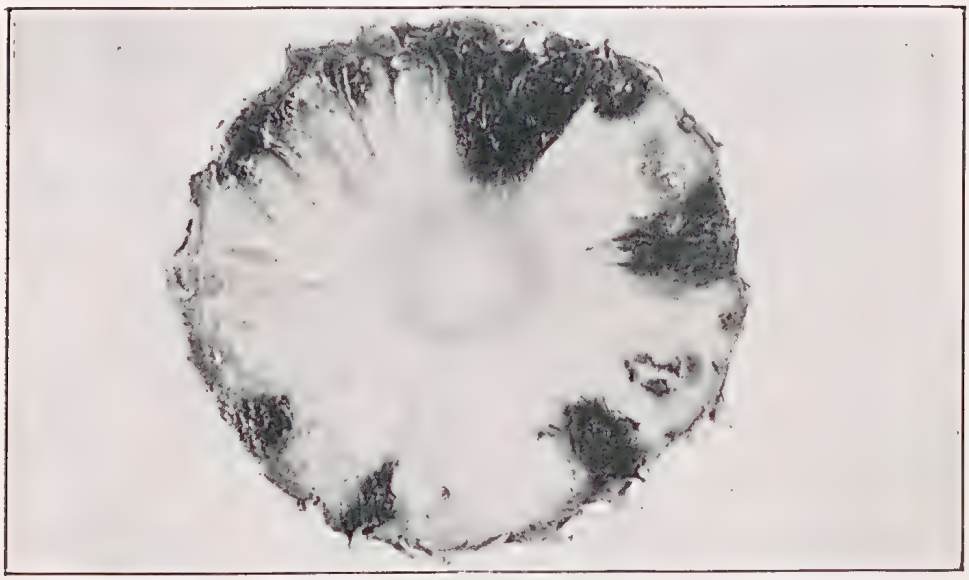

Fig 2.—Fruitlet Core Rot.
Plate 132.

fruit the rot will be indicated externally by the presence of a dark somewhat sunken area on the skin. Internally the affected region is at first watery and yellow, but later turns black as the macrospores of the fungus commence to be developed.

Occasionally the leaf of the pineapple is attacked, giving rise to light-yellow or straw-coloured spots of fairly regular outline surrounded by a narrow brown margin. These spots are usually developed in connection with scratches caused by the spines of contiguous leaves. While not in sufficient numbers to have any deleterious effect on the plant, these lesions may serve as one means for the perpetuation of the fungus in the field.

To avoid Thielaviopsis fruit rot care must be given to handling and packing in order to avoid any injury which might aid the fungus in its attack. The farm must be kept free from rotting fruit and other pineapple refuse, as this may cause the accumulation of the fungus spores, which will contaminate the air in which marketable fruit has to lie.

## Fruitlet Core Rot.

This disease is one found more commonly in connection with the winter crop of pines at a time when loss can be ill afforded on account of the high prices then obtainable.

### Symptoms.

The first symptoms may appear as the fruit approaches maturity, in the form of a failure of an isolated fruitlet or group of fruitlets to mature in conformity with the rest of the fruit. The affected portion retains a greenish colour while the rest is undergoing the normal yellowing. In other cases an affected fruit may exhibit no apparent external symptoms of the decay which may be present within. On cutting through one of these affected fruitlets there will be found a more or less extensive area of brown decay extending inwards from the base of the floral chamber. (Plate 132, fig. 2.) The extent to which the rot will extend depends on the number of fruitlets affected in the first place, and the conditions to which the fruit has been subjected favouring spread through the tissue. In some cases a considerable portion of the fruit may be involved, while in others there is little interference with the edible qualities.

### Cause.

Fruitlet core rot was first investigated in Queensland by Tryon in 1898, and the results of his work published in the "Agricultural Journal" of that year. He considered a mite (*Tarsonemus ananas* Tryon) to be the primary cause of the trouble so far as the Ripley Queen variety of pines was concerned. This mite is found in the cavity enclosed by the fleshy floral organs of the fruitlets, and in pursuance of its feeding habits pierces the softer tissue at the base of this floral chamber. A fungus (*?Monilia sp.*) which commonly occurs in the cavity is able to extend by means of these injuries and set up the rotting condition characteristic of the disease. The same author considered a similar disease affecting the smooth-leaf pine to be of a somewhat different character, since the fungus associated with it belonged to the genus *Penicillium*. Lately isolations made in separate instances from Ripley pines have yielded a *Penicillium* and a *Fusarium* apparently unassociated with other organisms, suggesting their possible causal relation to the rot.

PLATE 133.—LONGITUDINAL SECTION OF PINEAPPLE AFFECTED WITH TOP ROT.

### Control.

Before definite control measures can be recommended, further research will have to be undertaken into the general biology of the pineapple flower and the various fungi associated with rots of this type, giving special attention to their mode of transmission, infection, &c.

It has been noted that the extent of rotting is aggravated by tight packing, and care in this respect may help to alleviate the damage caused by this disease.

## Top Rot.

Top rot is a disease which is rather sporadic in its distribution and for this reason may be unknown to many. It is only recently that this trouble has received attention, and many points have to be cleared up before definite control measures can be advocated. However, since a number of growers are concerned regarding this disease, a short note dealing with it is included here.

### Symptoms.

The general appearance of a plant affected with top rot is not unlike the condition commonly known as "wilt." There is usually a certain amount of stunting and yellowing of the plant as a whole, and the leaves, especially the younger more upstanding ones, die back and shrivel from their tips. Finally the leaves fall flat and the plant breaks off about ground-level, when the upper portion of the stem will be found to be completely rotten. In the early stages of the disease, in order to determine whether top rot, rather than other causes of "wilt" symptoms, is present, it is necessary to attempt to pull out the terminal crown of leaves. If the plant is affected this will come away easily, and the leaves will be found to exhibit a light or somewhat mud-coloured rot at their base.

Infection appears to commence at the top of the stem. A longitudinal section of an affected plant will show an area of rotting tissue, flat-white in colour, near the apex. This may be of a fairly firm nature, but commonly invasion of soft-rot organisms produces a foul-smelling soft rot. (Plate 133.) The rot extends through the stem, working up through the leaf-bases as these are reached. The leaves are not usually invaded for more than half an inch up except towards the top of the stem, where more may be included and even the whole of the young terminal shoot affected. The advancing edge of rot in the leaves is defined by a somewhat irregular water-soaked band, while in the stem and older leaf-bases there is a definite dark-brown border. Top rot may affect scattered plants, but it is more common to find certain areas of the plantation exhibiting a fairly high percentage of infection while the rest is practically free. A loss of from 60 to 70 per cent. has been noted in such places. This localisation does not appear to be dependent on special soil factors.

The disease may be found affecting all the common commercial varieties of pineapple, though possibly the Ripley variety has shown the highest infection. Plants grown with and without paper mulch may be attacked. Loss from top rot occurs in new plantings before the first fruit are thrown; older plants appear to be rarely attacked.

Top rot makes its appearance about the middle of winter, and from then onwards until early summer plants may be found showing the disease in various stages. Apparently the disease reaches serious

proportions only after seasons when the summer and autumn rains have been exceptionally heavy.

Control.

A fungus (*Phytophthora sp.*) has been isolated in several instances from the margin of invasion into young leaves. Although it is considered possible that this organism is causally related to the disease, a definite conclusion will have to await the results of inoculating this fungus into healthy pines. In the meantime it may be assumed that the disease is of a parasitic nature. There is also evidence that spread of the disease takes place by means of spores formed in connection with the decaying leaf-bases. The water lodging round the bases of the leaves forms an excellent situation in which spore production and also infection may take place.

It is therefore recommended that affected plants be carefully removed and burnt as soon as they are detected; in this way spread of the disease may be considerably checked. Some growers have been in the habit of leaving the old butt in the ground, since a shoot will often appear from below the rotted region and a healthy plant result. This is unwise, as the remains of the previously rotted portion may serve to spread the disease to other plants later.

## Tangle Root.

Tangle root is not a disease of a parasitic nature, but is due to a combination of certain unfavourable meteorological and soil conditions.

Symptoms.

Tangle root appears usually in a newly planted field. Certain of the young plants fail to keep pace with their companions, and commence to assume a reddish-yellow colouration of the leaves, which gradually die back from the tips. The number of affected plants varies considerably, and these are usually scattered indiscriminately along the rows.

Cause.

The aboveground symptoms somewhat resemble wilt, but on pulling up a plant the difference will become apparent. It will be found that the roots, in place of radiating evenly from the base of the sucker, are wound tightly round the stem beneath the persistent leaf-bases. (Plate 134.) The roots in this condition are unable to perform their normal function of nourishing and sustaining the growth of the plant.

The trouble arises from planting suckers during dry weather in badly worked or stiff soil. Under these conditions the lower leaves do not rot off, and the roots developing from dormant buds lying beneath them are forced to circumnavigate the stem in their efforts to find a way out of the soil. Daughter suckers on older plants may sometimes exhibit the same trouble and fail to root, when, as is usually the case, they bend over to the ground, thus leaving the fruit less well nourished.

Control.

1. Tangle root may be easily prevented by stripping off a few of the lower leaves of the suckers, which should then be dried for a few days in the sun in order to lessen the chance of subsequent rotting by *Thielaviopsis*.

2. Plant only in well-worked land that is not in an excessively dry condition. See that good cultivation is afterwards maintained.

### Other Pineapple Diseases.

Certain other diseases of the pineapple, such as black heart and water blister, are more or less of seasonal occurrence, and are possibly of physiological rather than parasitic origin. Little is known regarding these maladies, and investigation of these and other pineapple diseases is being prosecuted as opportunity permits.

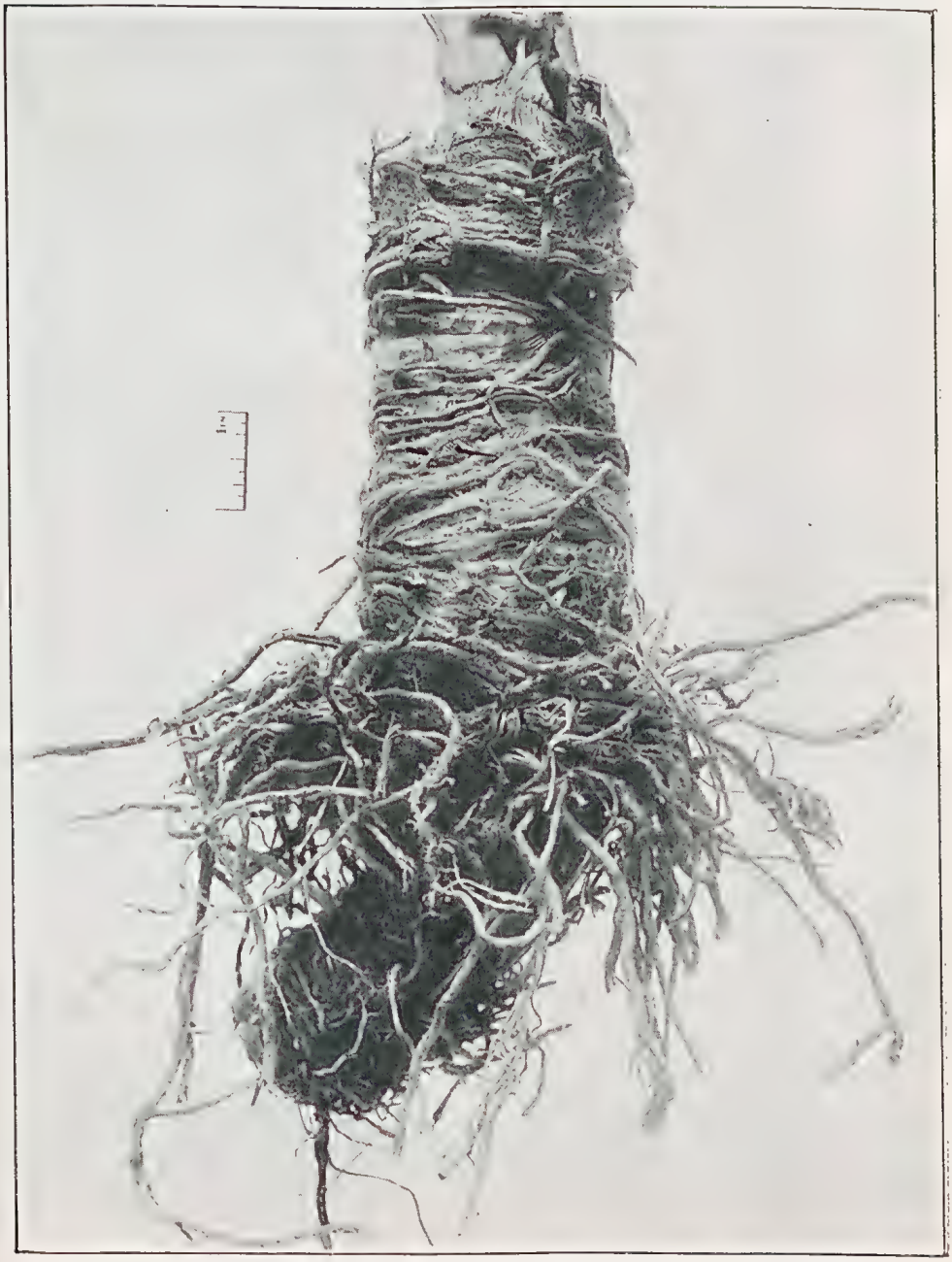

Plate 134.—Pineapple Plant with Leaf-bases removed to show Tangle Root condition.

Plate 135.—Wide Bay and Burnett District Exhibit, 1st in A Grade. Royal National Show, Brisbane, 1929.

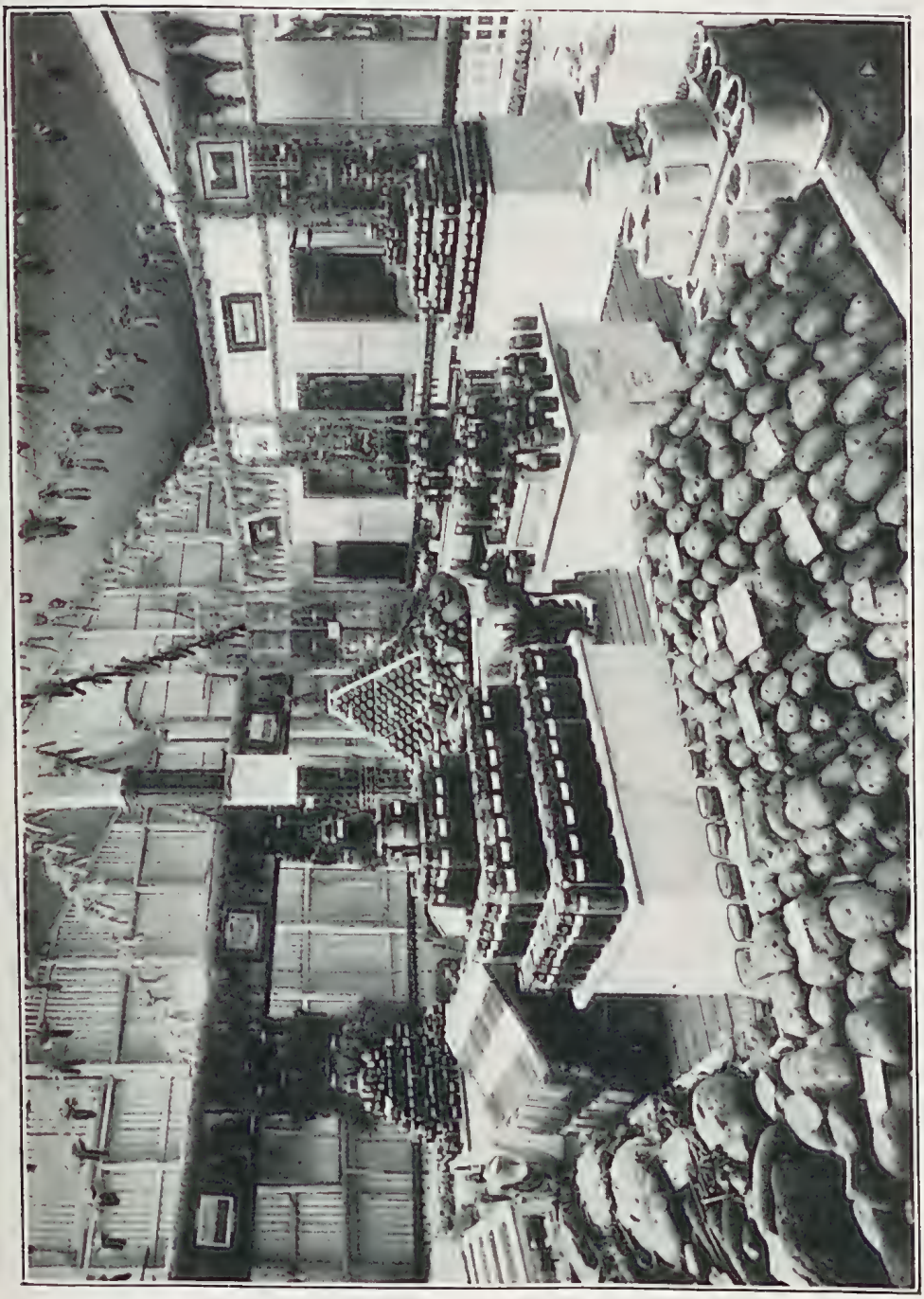

PLATE 136.—BRISBANE VALLEY DISTRICT EXHIBIT, 1ST IN B GRADE. ROYAL NATIONAL SHOW, 1929.
The great and varied resources of the valley of the Brisbane River were well illustrated at the recent Exhibition.

# AGRICULTURAL BANK ACT.

## MINISTER'S SPEECH ON AMENDING MEASURE.

A BILL to amend the Agricultural Bank Act was introduced to the Legislative Assembly on 5th September by the Minister for Agriculture and Stock, Hon. Harry F. Walker. In the course of his initiatory speech, which is taken from "Hansard," Mr. Walker said:—

This is a very small Bill, which the Government have considered desirable to introduce as a result of experience during the last few months. One of the objects of this Bill is to provide for the granting of relief to necessitous clients of the Agricultural Bank in the payment of their instalments of interest and redemption. Usually borrowers are in a position to fulfil their obligations, but occasions arise when it is desirable to be in a position to extend as much leniency as possible. At the present time relief can only be afforded by the making of a fresh advance involving the execution of further securities, and always a certain amount of expense. This Bill will obviate this unsatisfactory position.

When the original Agricultural Bank Act was passed in 1901, the intention was that the Crown, as usual, should have priority over all other creditors; but, following on the passing of the Agricultural Bank Act of 1923, it was found that a purchaser buying a foreclosed property from the Agricultural Bank became liable for all arrears of rates thereon. This Bill will give the Crown's debt its usual priority over all other charges, assessments, etc., that may have been levied by various authorities. It provides, also, that local authority rates and other dues shall not be recoverable from the bank or the person who buys the foreclosed property from the bank. However, where sufficient moneys are realised on the sale of the assets, the bank may liquidate such rates, &c., out of the surplus. That is the principal clause of the Bill, and the only one which you can say is of any great importance in it. This amendment arises from a decision given in a recent law case.

There is another small clause giving the manager of the Agricultural Bank or any officer of that bank the right to become an auctioneer to sell properties disposed of by the bank.

Mr. W. Forgan Smith: Those are properties where the bank is in possession?

The Secretary for Agriculture: That is so—properties of which the bank is in posesssion and which are about to be sold. This clause will place the manager or an officer of the bank on the same footing and possessing the same power as is held by an officer of the Public Curator. That is the sum total of the Bill, which is quite a small one.

The limit of the advance is 16s. in the £1; but in some cases applicants are advanced the full amount required. This Bill will not affect the advances made by the bank.

### Financing New Settlers.

I realise the hardship imposed on new settlers so far as finance is concerned on account of the tightness of the money market; but their lot has been eased somewhat by the smoothness of the working of the administration, although the advances specified in the Act at the present time cannot be altered because of the present position of the money market. I think the main objection with regard to the Agricultural Bank is due to the fact that the whole of its administration is from Brisbane, and its clients extend as far as the Atherton Tableland and even further north. Consequently, certain delays have taken place. I hope that, as time goes on and more capital is obtained, the bank will have more money at its disposal. That will enable applications for loans to be expedited, and obviate the delay arising in connection with making advances to clients.

## MR. WALKER'S SECOND READING SPEECH.

Subjoined is the "Hansard" report of Mr. Walker's second reading speech on the measure:—

The Secretary for Agriculture (Hon. H. F. Walker, *Cooroora*): I have very little to add to what I said when introducing this measure beyond stating that, when the original Agricultural Bank Act was put on the statute-book in 1901, it was intended that moneys advanced under the Act should be secured to the Crown in priority to all other charges, liens, or encumbrances, and, further, that the bank's security should be prevented from being disturbed by any means whatsoever, including any sale under a judgment, execution, or any process of law. Hence, in the Act

and subsequent legislation dealing with the making of advances by the Crown, it is provided that no judgment, order, or decree of any court of law shall in any way interfere with the security for any advances made.

In view of counsel's opinion obtained in 1924, it has been contended by the Crown since that date that section 25 of "*The Agricultural Bank Act of* 1923" provides that, from and after the execution of any mortgage in favour of the bank, any rates levied by and payable to any local authority in respect of a property mortgaged to the bank were not protected, and that the bank was not liable for the payment of rates, and that a purchaser from the bank obtained a title free from arrears of rates. That is the principal clause in the Bill; the others, which are of a minor character, have been dealt with minutely. . . .

**The Bank's Liability.**

. . . . Recently, a local authority sued a purchaser from the bank, as the duly constituted agent for the Secretary for Public Lands, of a property mortgaged to the Secretary for Public Lands to secure the repayment of certain advances under the provisions of the Discharged Soldiers' Settlement Acts, which Acts are read and construed as one with "*The Agricultural Bank Act of* 1923," for rates which had accrued prior to the date of sale, and succeeded. The then Government authorised the bank to appeal against the decision; but the Full Court of Queensland dismissed the appeal. The effect of the Full Court's decision is that, in the event of any sale by the bank as mortgagee in possession, or as agent for the Secretary for Public Lands, the purchaser may be liable for the payment of arrears of rates. As a matter of fact, the judgment went a great deal further. The bank to-day is not only responsible for the arrears of rates, but is also responsible for such items as the Leader of the Opposition mentioned just a few moments ago. It also makes the bank responsible for the clearing of noxious weeds on behalf of local authorities, and is also responsible under the Fencing Act. The Agricultural Bank was established for the one purpose of helping people on the land in poor circumstances, and should never be liable for any of those matters to which I have referred. Of course, some people think the Agricultural Bank should be put on the same footing as a private bank.

Mr. W. Forgan Smith: It could not be.

The Secretary for Agriculture: The Leader of the Opposition, who administered this Act for some considerable time, knows that that could not be, for the simple reason that it is purely a bank to help the small selector to get a start in life.

Mr. W. Forgan Smith: In addition to that, you pay interest on all money you use, and do not have the same margin to work on as an ordinary trading bank.

The Secretary for Agriculture: A private bank charges a great deal more interest. Private banks also get better customers, and they also have power to judge as to the character of an individual, and so on, whereas the Agricultural Bank has to take an applicant on his face value—that is, on the report as to whether the work can be done, and whether the security is sufficient to cover the loan.

Mr. W. Forgan Smith: They take into consideration the individual applicant, too.

The Secretary for Agriculture: We thought the Agricultural Bank was secured in such a way that the bank could carry on; but since this judgment of the Full Court, we find the bank is liable for thousands of pounds, which may be called in at a moment's notice. Naturally no bank could stand that. The ordinary bank, when making an advance, can secure itself in many ways. First of all, it is a bank of profit; secondly, it can take into account the character of the individual; and, thirdly, private banks have establishments all over Queensland in sufficient numbers to give quick administration. What is more, the bank's managers have power to advance small amounts without any further authority. Of course, all questions of large advances are referred to the head office; but the Agricultural Bank is in quite a different position. It would never do for the Agricultural Bank to be administered in any other way than it is to-day in regard to the protection of the advances made from time to time. During the previous stage of the Bill certain criticisms were levelled at the bank in regard to delays in making advances, and especially in regard to sympathetic administration and the need for decentralisation in many cases. References were also made to the fact that to-day the bank had no power to do these things. Since then I have taken the trouble to go into the matter, and I find that all these things can be done without any further amendment of the Act. . . . As times goes on, we see the need of these things. I have hopes of seeing the Act administered in such a way that it will give satisfaction to those who come under the scope of its lending powers.

### The Efficiency of the Bank.

The inspection staff at the present time is very small, and does not cover the amount of work which takes place from time to time. When a man makes application for a loan on the initiation of a new farm, the property has to be reported on. The inspector may have to go 50 miles, inspect the property, and then send his report to Brisbane. Consequently, there is a certain delay; but, notwithstanding the alleged delay which takes place, I was astonished to see the efficiency with which the work was carried out. It must not be thought that, because I am administering the affairs of the bank, I am unduly eulogising the members of the staff. The work with regard to inspection is carried out as expeditiously as possible, but in some cases the inspectors are very far apart, and it may be necessary to put on more inspectors from time to time with a view to getting the work done more quickly. It may be thought wise later on to establish a branch up north with greater authority. That is a phase of the question which struck me very forcibly while I was in the North. I really think that part of the State is too far away to get effective and quick administration. A man may apply for an advance of £100 to fell scrub. After the application is made the inspector has to go along and see that the scrub has been felled before the money is granted. That is another delay, showing conclusively that there is a lot in the argument for greater authority being exercised up north. If the inspection, for instance, cost 30s. per day, it would mean a considerable amount, because an inspector may have to make a dozen visits before the borrower's requirements are met. It will, therefore, be seen that the inspection of these properties is a very big item to the bank. When I mention that last year the inspection fees showed a loss of £7,801, and that the loss for eight or ten years past has been approximately the same, it shows what an expensive item it is. It also shows that, to get these inspections made rapidly, it would cost a great deal more. That is a phase of the question we have to take into consideration with regard to the expense of working the bank.

It is rather a peculiar position to be in; but I want hon. members to realise the position, so that they will not be harsh in their criticism of the Bill, because I am satisfied that matters can be greatly improved by decentralisation to a certain extent and putting on more inspectors, which we have power to do. As I have pointed out, the advances made by the bank are for the purpose of assisting primary production, and not for helping the man who has a really good security.

### Risks that are Run.

At the present time the bank runs many risks. One of the faults we find is that the bank at times has lent too much. It has a very liberal margin—£1,700 is the maximum amount of advance now—but in many cases the bank has lent too much to individuals in order to secure the business; and that is the reason why local authorities have experienced a great deal of trouble in collecting their rates. In view of the very liberal advances made by the bank originally, no margin of security remains if there should be a depreciation of improvements and mortgaged properties have been abandoned. Anyone who goes on the land knows perfectly well that, if you do not get a good fall, you may get a heavy growth of noxious weeds the first year, and if you leave it till the second year it is worse than it was before the original falling of the scrub. You may have a large growth of noxious weeds and foreign grasses, which will depreciate the value of the security, showing the risk which the bank runs at the present time.

### Local Authorities Protected.

The question then comes up whether the bank has played the game with local authorities. I think that the bank has done remarkably well, and has protected local authorities in every case where it was possible to do so. Of course, if they have overloaded the security or made too great an advance above the actual value of the security, the bank is unable to give the local authorities anything at all; but the bank has helped them in every way, and, if the bank is to be held responsible for all the rates owing on properties in its hands, then hon. members will understand that some local authorities may be inclined to use the bank to collect their rates. Such local authorities may say, "These properties have the bank behind them. We will whip a bill into the bank and collect the rates from it." I have a case in point. There was a proposal in respect of a certain drainage area which I put before the Premier. In that district the local authorities would not father the scheme because they said that the bank to a certain extent would interfere with them in collecting the rates from the holders of mortgaged lands in the district. I had a complete return of the lands in respect of that area, and I found that the outstanding rates owing to that

local authority were greater on properties other than those in the hands of the bank than they were on the bank's properties. In other words, there was negligence on the part of the shire council in carrying out its work of collecting the rates. So hon. members will see what a grave danger would be created if the amendment were not made in the Act as the Bill proposes. In this connection hon. members must bear in mind that the Agricultural Bank helps local authorities in many ways. It requires new applicants to pay rates before receiving loans; it requires borrowers to pay accruing rates on advice from local authorities that rates are unpaid; it includes in the reserve price of properties being disposed of for default a sum sufficient to pay rates up to date; and it pays local authorities rates from the proceeds of the sale of such properties where such proceeds are sufficient to enable it to do so. I think hon. members will agree that local authorities get every protection from the Agricultural Bank; but, after all, the rates are really nothing in comparison with the other items for which the bank might be held responsible accordng to the judgment of the court, without the right of appeal to any court of law. It was generally thought that the power I now propose to take was in the original Act, and it was only through the case to which I have referred that the discovery was made as to the far-reaching effect of the burden which might be placed upon the bank.

**Minor Matters.**

The other clauses in the Bill are of minor importance. One of them deals with the appointment of the manager of the bank or other officer as a licensed auctioneer for the purpose of conducting sales at public auction, wherever possible, whilst the other is designed to grant relief from the payment of redemption instalments in necessitous cases. At present fresh securities have to be registered, which in some cases costs a considerable sum, and it is proposed by this Bill to do away with that procedure, and thus expedite the business of the bank and save the applicants further trouble and expense.

I do not think I can add anything more to what I said on the initiation of the Bill in Committee. I have given hon. members some idea of the principal clauses, and I have very much pleasure in moving—

"That the Bill be now read a second time."

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## THE SIMAR ROTOTILLER.

An interested gathering of farmers and experts followed the movements of a motor-driven implement, novel to most of them, which was demonstrated recently at the dairy farm of Mr. Stewart Conochie, on the Sherwood road, Oxley Creek. As long ago as 1924, Mr. A. C. Elphinstone, while on a visit to the Wembley Exhibition, was so much attracted by what he saw of this implement that he took occasion to run across to the Continent for the purpose of visiting the factory in Switzerland where it was being manufactured. He has now secured for Elphinstones Limited the sole distributing rights in Queensland. The machine domonstrated was what is known as the 10 h.p. size. Essentially it consists of an engine which can be worked either on petrol or kerosene, carried on a pair of broad-tyred wheels and directed by means of a suitable pair of handles controlled by the operator who walks behind. The engine drives a shaft or "miller" on which are mounted suitable tines revolving at a rapid rate, and which in their impact upon the soil tear the apparatus forward at a pace practically as fast as the man can walk. Three types of tine are supplied suitable to different classes of work. The engine power can also be made available for any class of work within its h.p. capacity.

The land on which the demonstration was given was old paspalum pasture, dry, and hard-trampled by stock. The matted growth was easily torn up by the rototiller. Work was shown also on cultivated land, dry and lumpy, in which the machine prepared an excellent seedbed at a single operation. Experienced farmers considered that it would be excellent for renovating either pastures or old lucerne fields, loosening the soil without destroying the roots, and that it would be most useful for working in orchards or market gardens. The fact that the controller of the machine would have to walk was regarded by some as an obstacle in the way of using it in cane cultivation, but by others it was thought that it would prove exceedingly useful in working up and down the cane rows in the earlier stages, loosening the soil and eradicating weeds.

Plate 137.—First Prize One Farm Display, Exhibited by W. D. Ponton, Tuggerah. Royal National Show, 1929.

PLATE 138.—SCIENCE ASSISTS IN THE EVOLUTION OF NEW CEREALS.

The highly technical work of wheat-breeding for Queensland conditions of Summer rainfall was well illustrated by this trophy at the Brisbane Exhibition.

## IN MEMORIAM—HENRI A. TARDENT.

By the death on Thursday, 5th September, at his home, "Ormonts," Wynnum, of Henry A. Tardent, Queensland lost a citizen of the best and most patriotic type. Born in Switzerland seventy-seven years ago, the late H. A. Tardent, though practically self-educated, proved himself a brilliant scholar, with a special gift for languages. At the age of sixteen he went to Poland as a teacher of French. Later he went to Russia, and graduated at Odessa University as Professor of the French and German languages. In 1887 he migrated to Queensland. For some years he was at Roma, where he entered into wine-making and general farming. Later he became the first manager of the Westbrook and Biggenden State farms. Afterwards and almost until the end he followed up journalism and literature, serving for some years on the staff of the Brisbane "Daily Standard," and contributing numerous articles to "The Worker" as well as to other papers. He was the author of many treatises, biographies, and essays. Besides his contributions to Australian papers, he was this country's correspondent to the Paris "L'Illustration," the "Revue," of Geneva, and the "Gazette de Lausanne." His published works (some of them prize essays) include biographies of Richard John Randall (Queensland artist), George Essex Evans (Queensland poet), and Mrs. Ellis Rowan, whose paintings of Australian wild flowers are of the highest order of artistic excellence. He also wrote "Reflections on an Australian Literature," "The "Influence of Poetry on Modern Life," "Art and Its Value as a National Asset," "The Functions of the State in Relation to its Commercial Life," "Arbitration v. War for the Settlement of International Disputes," "The Future Development of Western Queensland," "Science as Applied to Agriculture," and "Australia's Contribution to the World War," besides numerous works in French on various phases of Australian life and its development. He was some time contributor to this Journal. His writings in French and Swiss publications, marked as they were by a high literary tone, did much to bring Australia, and particularly Queensland, before the eyes of large and new audiences in Europe, with results wholly beneficial to the country's reputation that are difficult to appraise. An article by him on "The Birth of Canberra," starred in the Paris "L'Illustration" with appropriate photographs, was a brilliant example of the best in high-class journalism, and probably proved one of the most effective advertisements the Commonwealth has received in any country outside of Britain itself. As a crowning and fitting climax to his numerous contributions to French papers, work regarding which but few Australians had any knowledge, he was awarded in March by the French Government the distinction of O.A. (Officier d' Academie) for services rendered to literature, science, and art.

The funeral to Bulimba Cemetery was largely attended, those present including the Consuls of Switzerland and France, and representatives of the Authors and Artists' Association, Royal Geographical Society, Alliance Francaise of Brisbane, various Labour organisations, different departments of the public service, and other bodies.

Among those gathered around the graveside were many—men of culture from our universities, men of science, men of letters, and men of affairs—who knew that the sad ceremony in which they were taking part was no ordinary one, but that the casket being committed to the earth in their presence contained the remains of a good Australian—one whose work and worth, recognised during his life by an ever-growing circle, will be appreciated more and more as the future unfolds. For Australian culture, still in its formative stage, owes a debt to Henri Tardent—its sponsor and champion, its guide, philosopher, and friend. When it is rightly understood, when Australian art, letters, science, music, and all the various forms of national self-expression in their highest come into their own, Henri Tardent will be accorded a place in the history of its development that his pioneering labours on its behalf and his unbounded faith in its future have earned for him.

With his possession of high intellectual qualities, wide scholarship, and culture in many branches of study, Henri Tardent was one of those rare souls who, by his sunny nature and overflowing good will, endeared himself to those fortunate enough to be numbered among his intimates.

# CLIMATOLOGICAL TABLE—AUGUST, 1929.

Supplied by the Commonwealth of Australia, Meteorological Bureau, Brisbane.

| Districts and Stations. | Atmospheric Pressure. Mean at 9 a.m. | Shade Temperature. Means. Max. | Means. Min. | Extremes. Max. | Date. | Extremes. Min. | Date. | Rainfall. Total. | Rainfall. Wet Days. |
|---|---|---|---|---|---|---|---|---|---|
| *Coastal.* | In. | Deg. | Deg. | Deg. | | Deg. | | Points. | |
| Cooktown | 30·05 | 80 | 69 | 83 | 14, 24 | 59 | 25, 2 | 43 | 7 |
| Herberton | .. | 73 | 51 | 82 | 23 | 34 | 25 | 6 | 1 |
| Rockhampton | 30·14 | 77 | 54 | 87 | 22 | 42 | 25 | 5 | 3 |
| Brisbane | 30·17 | 72 | 51 | 83 | 22 | 42 | 3 | 95 | 4 |
| *Darling Downs.* | | | | | | | | | |
| Dalby | 30·17 | 73 | 41 | 83 | 30 | 30 | 7, 8 | 29 | 5 |
| Stanthorpe | .. | 62 | 34 | 74 | 16 | 24 | 3, 7 | 113 | 7 |
| Toowoomba | .. | 66 | 42 | 78 | 16 | 26 | 8 | 69 | 5 |
| *Mid-interior.* | | | | | | | | | |
| Georgetown | 30·02 | 85 | 53 | 90 | 13, 14 | 40 | 2 | 0 | .. |
| Longreach | 30·10 | 81 | 48 | 93 | 22 | 36 | 25 | 0 | .. |
| Mitchell | 30·15 | 72 | 41 | 86 | 15 | 26 | 1 | 39 | 3 |
| *Western.* | | | | | | | | | |
| Burketown | 30·04 | 83 | 58 | 91 | 23 | 49 | 3, 4 | 0 | .. |
| Boulia | 30·08 | 80 | 51 | 93 | 14 | 40 | 8 | 0 | .. |
| Thargomindah | 30·13 | 71 | 46 | 90 | 15 | 33 | 12 | 10 | 2 |

# RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of August in the Agricultural Districts, together with Total Rainfall during August, 1929, and 1928, for Comparison.

| Divisions and Stations. | Average Rainfall. Aug. | Average Rainfall. No. of Years' Records. | Total Rainfall. Aug., 1929. | Total Rainfall. Aug., 1928. |
|---|---|---|---|---|
| *North Coast.* | In. | | In. | In. |
| Atherton | 0·84 | 28 | 0·26 | 1·08 |
| Cairns | 1·74 | 47 | 0·84 | 0·59 |
| Cardwell | 1·30 | 57 | 0·24 | 0·98 |
| Cooktown | 1·29 | 53 | 0·43 | 0·02 |
| Herberton | 0·64 | 42 | 0·06 | 0·12 |
| Ingham | 1·51 | 37 | 0·47 | 0·67 |
| Innisfail | 5·16 | 48 | 1·85 | 3·78 |
| Mossman | 1·29 | 16 | 0·33 | 0·14 |
| Townsville | 0·53 | 58 | 0 | 0 |
| *Central Coast.* | | | | |
| Ayr | 0·61 | 42 | 0 | 0 |
| Bowen | 0·67 | 58 | 0·27 | 0 |
| Charters Towers | 0·58 | 47 | 0 | 0 |
| Mackay | 1·08 | 58 | 0·19 | 0·17 |
| Proserpine | 1·39 | 26 | 0·74 | 0·70 |
| St. Lawrence | 0·87 | 58 | 0 | 0·12 |
| *South Coast.* | | | | |
| Biggenden | 1·67 | 30 | 1·42 | 0·35 |
| Bundaberg | 1·30 | 46 | 0·39 | 0·25 |
| Brisbane | | 78 | 0·95 | 1·05 |
| Caboolture | 1·56 | 42 | 1·00 | 0·98 |
| Childers | 1·22 | 34 | 0·82 | 0·28 |
| Crohamhurst | 2·22 | 36 | 1·25 | 1·07 |
| Esk | 1·54 | 42 | 1·43 | 0·70 |
| Gayndah | 1·18 | 58 | 0·69 | 0 |
| Gympie | 1·76 | 59 | 1·21 | 0·49 |
| Kilkivan | 1·45 | 50 | 1·80 | 0·30 |
| Maryborough | 1·68 | 57 | 0·70 | 0·42 |

| Divisions and Stations. | Average Rainfall. Aug. | Average Rainfall. No. of Years' Records. | Total Rainfall. Aug., 1929. | Total Rainfall. Aug., 1928. |
|---|---|---|---|---|
| *South Coast*—continued: | | | | |
| Nambour | 1·89 | 33 | 0·07 | 1·05 |
| Nanango | 1·35 | 47 | 0·32 | 0 |
| Rockhampton | 0·98 | 42 | 0·05 | 0·05 |
| Woodford | 1·75 | 42 | 1·06 | 0·73 |
| *Darling Downs.* | | | | |
| Dalby | 1·22 | 59 | 0·29 | 0 |
| Emu Vale | 1·18 | 33 | 0·77 | 0·21 |
| Jimbour | 1·21 | 41 | 0·64 | 0 |
| Miles | 1·17 | 44 | 0·44 | 0 |
| Stanthorpe | 1·82 | 56 | 1·13 | 0·37 |
| Toowoomba | 1·71 | 57 | 0·69 | 0·90 |
| Warwick | 1·53 | 64 | 0·68 | 0·23 |
| *Maranoa.* | | | | |
| Roma | 0 97 | 55 | 0·21 | 0 |
| *State Farms, &c.* | | | | |
| Bungeworgorai | 0·90 | 15 | 0·19 | 0 |
| Gatton College | 1·19 | 30 | 0·02 | 0·63 |
| Gindie | 0·71 | 30 | 0·15 | 0 |
| Hermitage | 1·33 | 23 | .. | 0·35 |
| Kairi | 0·95 | 15 | .. | 1·11 |
| Mackay Sugar Experiment Station | 0·95 | 32 | 0·24 | 0·05 |
| Warren | 0·91 | 14 | .. | .. |

GEORGE G. BOND, Divisional Meteorologist.

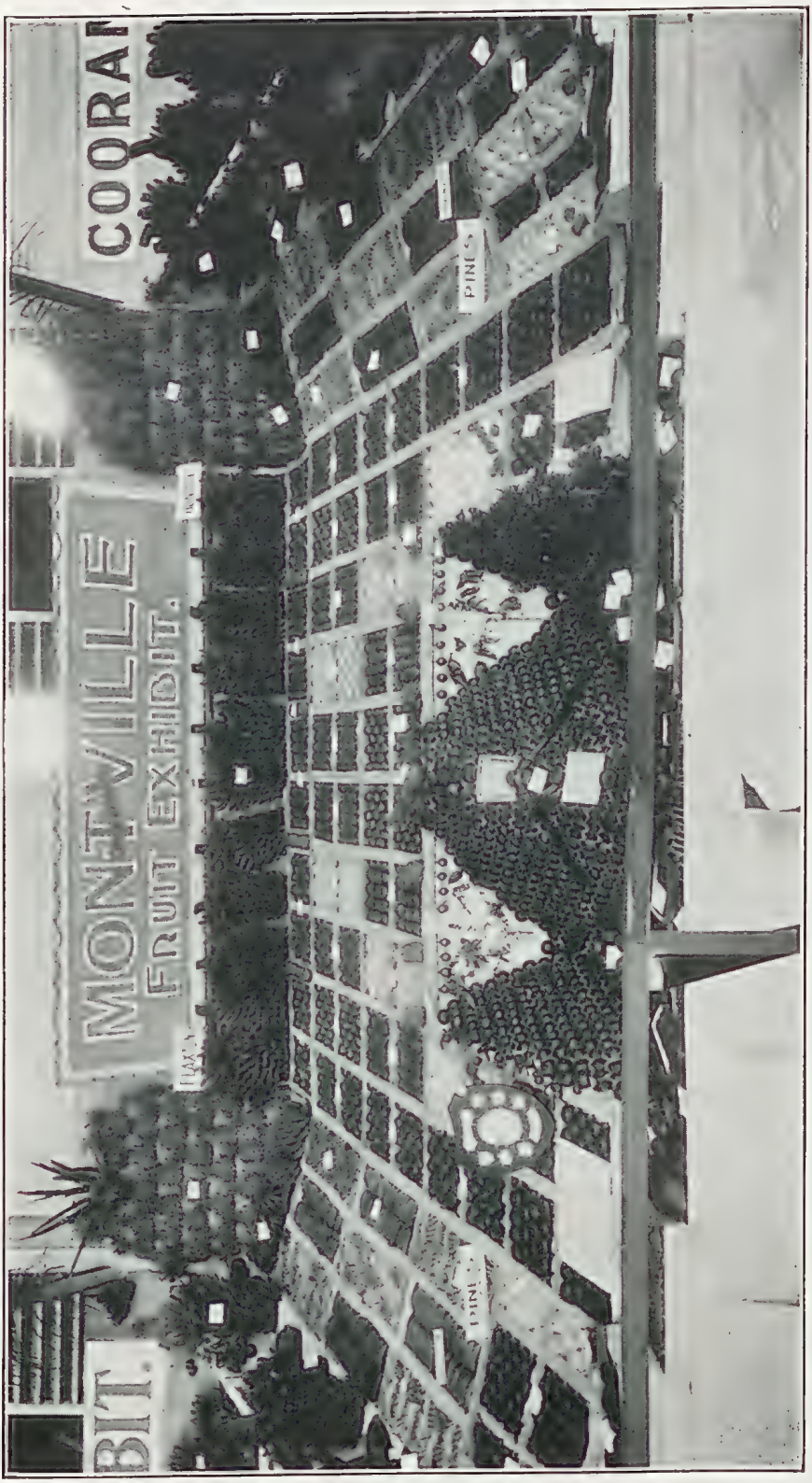


Plate 139.—Citrus and other Fruits from the Blackall Range, Montville District Fruit Exhibit at the Brisbane Show, 1929.

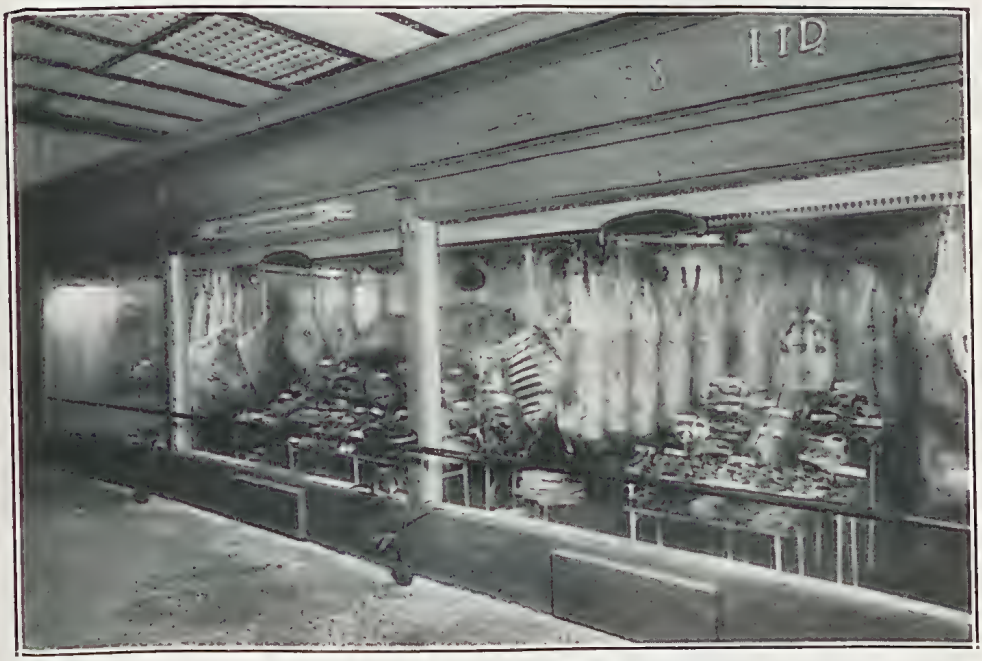

Plate 140.—Food for the Million.
A section of the Meat Industry Exhibit, Brisbane Show, 1929.

Plate 141.—By-Products of the Meat Industry illustrated impressively the Interlocking of Primary and Secondary Industry at the recent Brisbane Show.

# RURAL LIFE IN OTHER LANDS—V.

By the EDITOR.*

## JOURNEYINGS IN GERMANY.

Our first halt across the Border was at Aix-la-Chapelle—called Aachen by the Germans—Charlemagne's old headquarters and a city of ancient historical importance centred in a fertile basin surrounded by gently sloping hills. Though retaining its mediæval features it is now quite a modern city with fine, broad streets and attractive shops. Manufacturing is its main supporting industry and, significantly enough, smoke was pouring in dense volumes from every factory chimney. From there the way went on past the Castle of Frankenberg, through the Nurmer tunnel and the Reichsbusch Wood out into a picturesque district of busy industry based on iron and coal. Then came Eschweiler, set in a pretty valley, and then Duren, another very active centre. The line from there ran out on to a fertile plain studded with farmhouses and factories. The twin spires of the great Cathedral of Cologne, the square tower and tapering spire of St. Martin's, and the tower of the Town Hall soon topped the horizon, and before long we were rumbling over the Rhine getting our first sight of one of Europe's most famous waterways.

### Cologne and its Cathedral.

Cologne is a great city with treasures of art, monuments of beauty, quaint houses, and large modern stores. The interior beauty of its wonderful cathedral, the largest Gothic church in Northern Europe, covering an area of 91,000 square feet and accommodating 24,000 persons, left an ineffaceable impression. Its massive spires merging into one huge mountain of fretted stone make an historic landmark around which the traditions of more than six centuries have gathered, and which is still a centre of tender sentiment to the people of the Rhine. This great cathedral, like that of Amiens, dominated its subject city in the days of old and it still presides over Cologne, remaining a marvel of ancient architecture among many modern structures of far less grace and charm.

While the citizens of other days set themselves the task of translating stone into terms of spiritual beauty, those of the present age are busy building for comfort, pleasure, and illusion. In principle and effect their efforts differ diametrically—the difference of the spiritually beautiful and the materially excellent.

In Cologne, as elsewhere in Germany at that time, though militarism and war had been revealed in all their stark insanity, one encountered in every public place the forbidding frown of an arrogant imperialism expressed in grotesquely graven monuments, and now happily submerging rapidly in the rising tide of an educated and disillusioned democracy.

Further down the Rhine towards the Border of Holland is Dusseldorf, with its beautiful public gardens, fountains, and boulevards. It calls itself the city of arts and the muses. We knew it as the birthplace of Heine. Thackeray and Bulwer Lytton had already made us familiar with Rhineland celebrated in a hundred romances; around every rock and rise legends have gathered making it classic ground.

### Co-operation in Germany.

The success or otherwise of agricultural co-operation in Germany was one of the main subjects of our inquiry, and we will forget history and scenery for awhile and consider some post-war developments in this connection. In the year of my visit there was an unprecedented increase of new co-operative societies, a total of 3,421 being reached, showing, if one omits those established in areas removed from German jurisdiction under the Peace Treaty, a net increase of 676 societies on the previous year's figures. The total number of agricultural co-operative societies had reached the imposing total of 31,521—that is to say, 81 per cent. of the total registered co-operative societies. More than four-fifths then of German co-operative societies were agricultural co-operative organisations. These figures show the enormous grip the co-operative idea has on the minds of the progressive German farmer. Their membership, estimated on the basis of the averages supplied by the statistics of the National Federation, was at least 3,000,000. Agricultural co-operation thus represents a form of rural organisation far superior to any other in Germany. As compared with the total population, there was one agricultural co-operative society for every 1,868 inhabitants, and as compared with the total productive area, one co-operative society for every, say, 2,000 acres of land. Of these societies 97.4 per cent. were affiliated to co-operative federations, and of these 66 per cent. belonged to the National Federation of German Co-operative Societies and the balance was divided among other federations. The number of central co-operative societies (central banks and central co-operative societies for purchase and sale) was eighty-six.

* In a radio address from 4QG.

The co-operative banks, on figures, were very successful—figures which, in view of currency depreciation at the time of my inquiry, there would be no use now in quoting.

The co-operative societies I have mentioned included organisations for the purchase of agricultural requisites (fertilisers, stock foods, seeds, and machines, and other commodities).

The state of the exchange and the consequent difficulties of commercial relations with other countries, together with trading restrictions, industrial troubles, and transport difficulties, had, of course, a depreciating influence on the volume of business done. The economic situation during the war had given a marked impetus to co-operative selling, and also in the years after the war, in comparison with the pre-war period.

In the year I was there many new rural banks were established, 69 were dissolved, and 1,621 alienated as a consequence of the Treaty. Of these banks, 90.4 per cent. were on the basis of unlimited liability and the balance on more or less limited liability. Financially, however, the balance-sheets of these concerns showed large losses, which were put down to the great fall in the value of the securities held resulting from the fall in the war loan quotations. There were, possibly, other contributing causes.

Of the co-operative societies for purchase and sale of farm requisites and produce, 84 showed neither profit nor loss, 2,166 registered profits, and 240 showed a loss. Measured in marks the net profit was immense.

Of the co-operative dairy societies, 292 had neither profits nor losses, 1,189 showed a profit, and 191 losses. Of the other co-operative societies, most of these, according to the nature of their service, are on a limited liability basis, but on account of the currency and economic difficulties then prevailing it was difficult to judge their exact position.

Losses occurred in the case of co-operative societies for distilling, motor services, brick and some other manufacturing enterprises. Dehydration societies, livestock selling agencies, fish-selling businesses, ploughing and thrashing societies and similar organisations showed varying results. It must be remembered, of course, that these observations apply only to a year when industrial chaos was a normal European condition.

### Another Rural Exodus.

According to latest official reports on the economic situation in Germany, agriculture, however, in spite of all the economic devices to improve the lot of the man on the land, is, as in every other agricultural country in the world, far from satisfactory. The unbalanced economic position in South-West Germany particularly had led to a situation under which farmers, in many instances, were unable to make a living. The result had been a large emigration of farmers, limited only by the immigration restrictions of the countries in which they sought domicile. In 1871 the rural population of Germany was 64 per cent. of the whole population, while the present percentage is said to be only 35. These figures go to show that the rural exodus is common to every agricultural country. The remedy lies to some extent in making country life more payable and attractive.

### National Influence of Co-operative Societies.

In Germany the co-operative movement has been successful, to some extent, in stemming the tide of the general cityward trek. They certainly have been a great influence for the national wellbeing. To them must be credited much of the progress in the economic welfare of the country people of Germany in recent years, and their general influence on the improvement of rural conditions has been on every hand sound, instructive, and constructive. To the German farmer it has been a source of support, guidance, and enlightenment, and so he appreciates its value accordingly.

*A FARMER'S OPINION OF THE JOURNAL.*

*A Gayndah farmer writes* (7th *September*, 1929):—*I take this opportunity of expressing my high opinion of the "Queensland Agricultural Journal." It provides valuable and expert information which no intelligent producer can fail to enjoy and profit by."*

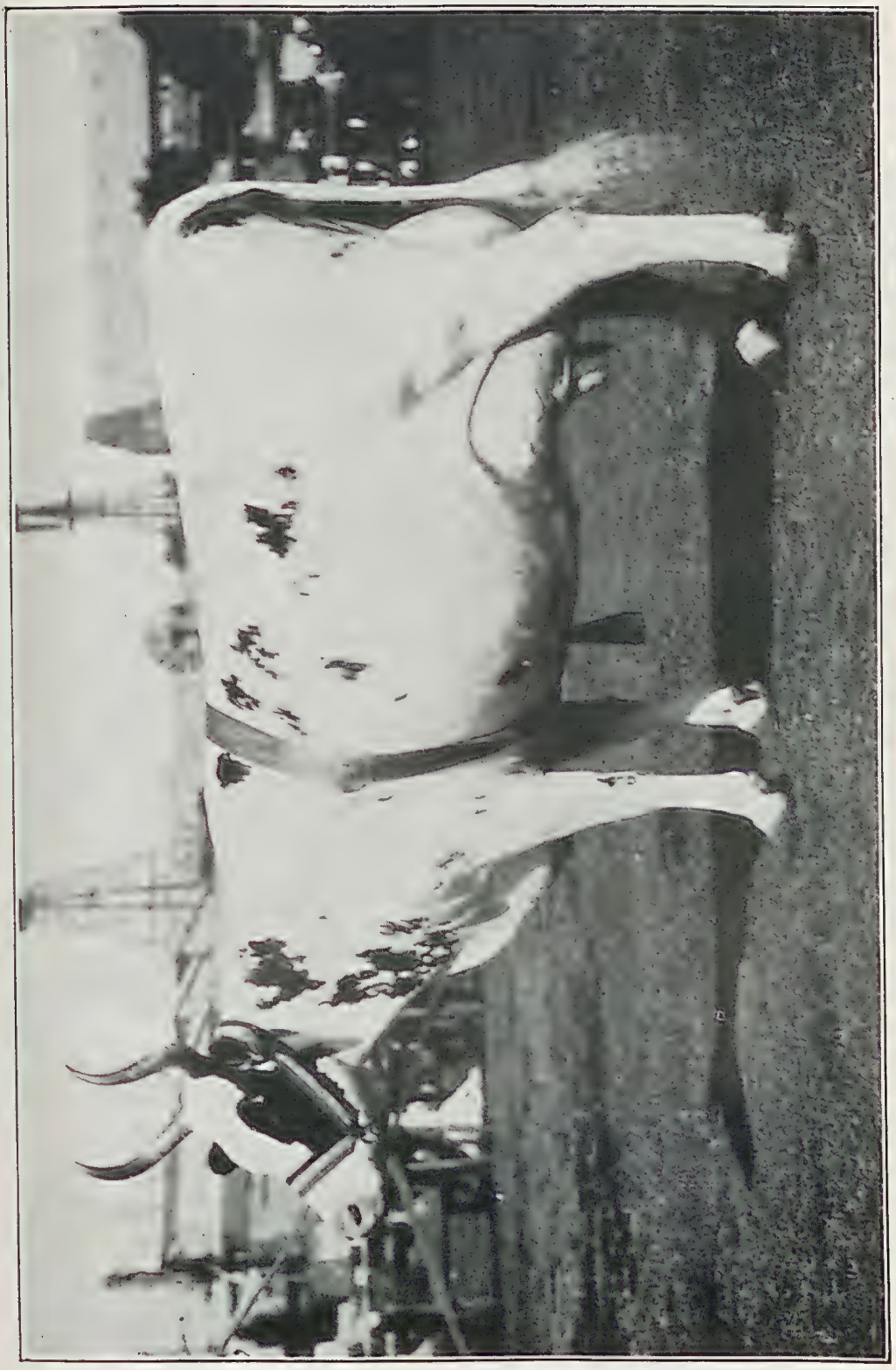

Plate 143.—"Beryl's Pride of Crescent Farm" (J. C. Mann), Champion Ayrshire Cow. Royal National Show, 1929.

Plate 144.—Missamurra Cherubine (A. S. Cook), Champion Guernsey Cow. Royal National Show, 1929.

Plate 145.—College Princess Pontiac (Hickey and Son), Champion Friesian Cow. Royal National Show, 1929.

Plate 146.—"Oxford Golden Buttercup" (Burton & Sons), Champion Jersey Cow, Royal National Show, 1929.

Plate 147.—"Favourite II. of Railway View" (A. T. Waters), Champion I.M.S. Cow, Royal National Show, 1929.

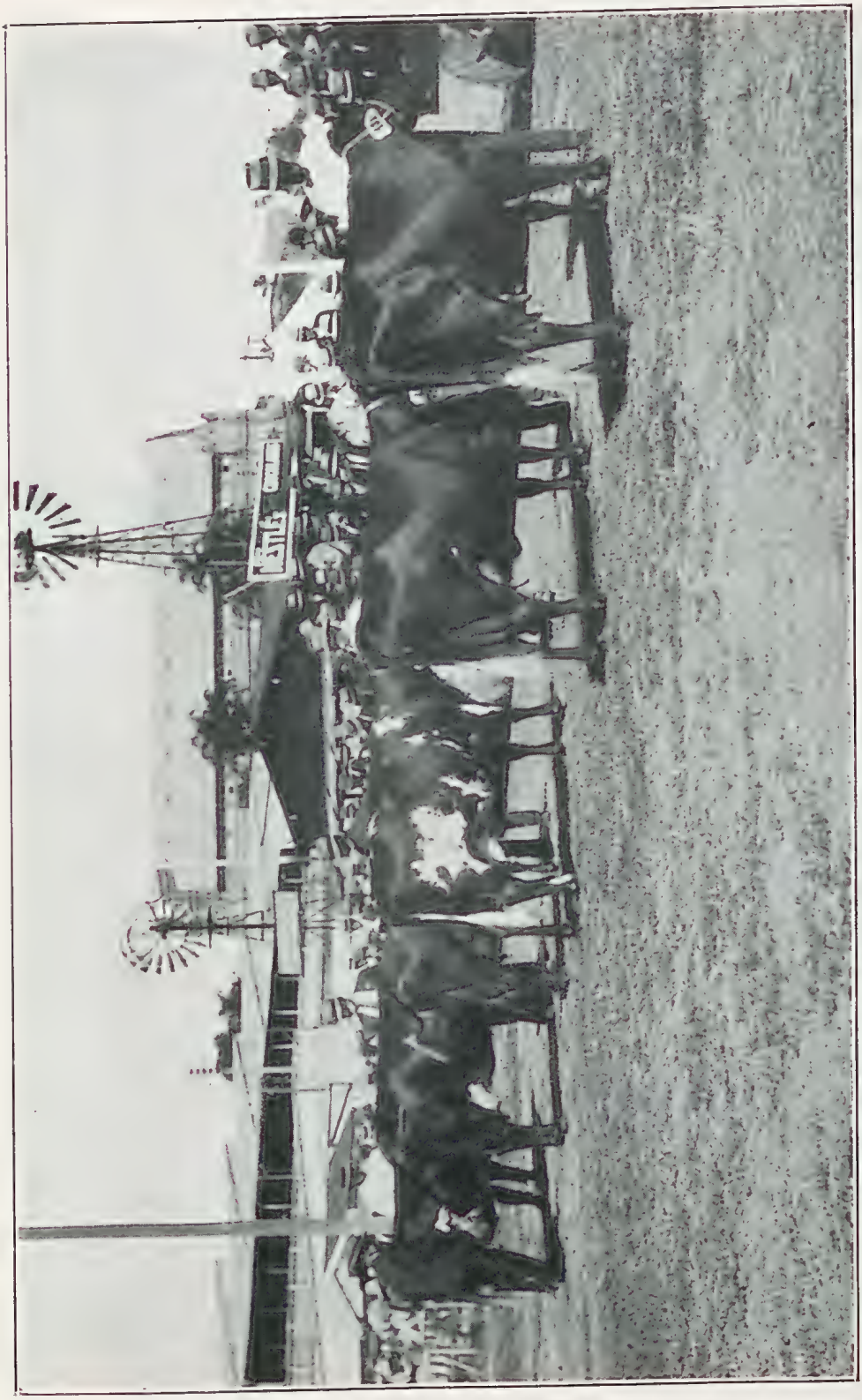

PLATE 148.—ILLAWARRA MILKING SHORTHORNS PARADED FOR JUDGMENT, ROYAL NATIONAL SHOW, 1929.

## ABSTRACTS AND REVIEWS.

### Pig Breeders' Annual for 1929-30.

(Year Book of the National Pig Breeders' Association, vol. 9. N.P.B.A., London. 3s. 6d. post free).

The current issue of the Pig Breeders' Annual is as informative and as comprehensive in its survey of pig breeding, feeding, and management in all parts of the world as the eight previous issues of this publication; in fact, volume 9 is even more informative. It is well illustrated, and is a useful publication for Australian pig farmers.

In a breezily written foreword, Viscount Folkestone, Vice-chairman of the British Pig Industry Council, stresses the importance of the work undertaken by the National Pig Breeders' Association of England, under whose auspices the Annual is issued, and emphasises that an organisation of the nature of the N.P.B.A., though primarily a pedigree pig society, covers a much wider field in its activities by taking the lead in investigating those wider questions of organisation, marketing, and scientific research the value of which is even greater to the non-pedigree commercial producer than it is to the pedigree breeder.

Lord Folkestone informs readers of many of the difficulties through which the British pig farmer has been passing during the past two years, a period characterised by unprofitable and unsatisfactory prices. He is, however, optimistic enough to believe that the unprofitable period is giving way to a profitable one, and it seems time, he thinks, to get the various organisations on a sound footing so that pig breeders shall be in a position when a lean time comes again to counter to some extent the forces that work against them.

### Contributors.

Mr. John Hammond, M.A., of the School of Agriculture, Cambridge, has an informative article on "Fertility in Pigs" which breeders everywhere would do well to study carefully. This article deals in detail with the whole subject of reproduction and indicates ways by means of which larger and better litters may be obtained and the general fertility of the herd improved. "Pig Testing and Litter Recording in Sweden" is dealt with in an interesting way by Sigfrid Larsson, a prominent authority in that country, where pig raising is coming to the fore in quite a remarkable way. An interesting survey of the "By-Products of the Pig Industry" is contributed by Mr. F. W. Jackson, A.C.G.I., B.Sc., A.I.C., in which detailed reference is made to both the edible and inedible products of the pigs. Principal Charles Crowther, M.A., contributes a breezy report of the "Work of the Harper Adams Pig Experimental Station" and informs readers of the various experiments in progress at the institution. "Mendelism" is dealt with by M. S. Pease, M.A., of the Small Animal Breeding Institute at the Cambridge University, while "Pig Production in America" covers a wider field and is contributed by Grady Sellars, B.S. Agri., a field agent of the Kentucky Agricultural Experiment Station.

A very important article on "Tuberculosis in Swine" by Major C. J. Saunders, D.S.O., B.V.Sc., M.R.C.V.S., will be read with intense interest by farmers, for this is a subject on which every stockman needs to be fully informed.

An article dealing with "Characteristics of the Berkshire Breed" by Mr. John R. Baker, M.A., D.Phil., will be of especial interest to Berkshire fanciers, while all pig raisers will be interested in Mr. R. McG. Carshaw's review of "Profits and Losses on Mixed Arable Farms." "Fruit Culture and the Pig" touches on another aspect of pig raising, and is dealt with by the Horticultural Superintendent of the Norfolk County Council. K. D. Downham's article on "Some External Parasites of Swine" is of interest, as also is A. N. Duckham's review of the "Interpretation of Pig Recording Results." Mr. Duckham is associated with the Animal Nutrition Institute of Cambridge, where much useful work is being carried out.

To Australian Pig Raisers, Mr. E. J. Shelton's review of "Breeds of Pigs in Australia" is of especial interest. This article is illustrated with photographs of a number of championship winners, and deals with the several breeds in this country. "Rate of Production in Pork and Bacon" by James Wilson, M.A., B.Sc., gives much interesting information, and this section carries some excellent illustrations of prominent prizewinning animals in Great Britain. "Pig Breeding in Poland" informs breeders of the progress of the industry in that country, while from the trade point of view the British pig industry is discussed in an article, "Prices, Distribution, and the Pig Industry," by Montague Fordham, the Secretary of the Rural Reconstruction Association. "Pig Breeding in the Soviet Union" indicates that there are many countries throughout the world where farmers are awakening

to the possibilities of this industry, and indicates that we need to be on the move if we hope to obtain a permanent footing in the markets of the world with our pork products. Much tabular information and excellent illustrations complete the best 3s. 6d. worth offering to the man who is interested in pigs for profit.

The secretary of the National Pig Breeders' Association, Mr. Alec Hobson, 92 Gower street, London, W.C. 1, will be pleased to communicate with breeders in any part of the world and to supply any further information required. Copies may be ordered through Mr. E. J. Shelton, Senior Instructor in Pig Raising.

**"Sugar-Cane and its Culture (1928)."**

(F. S. Earle, Chapman and Hall, Covent Garden, London, W.C.2, and John Wiley and Sons, Inc., New York. 22s. 6d. net.)

This book was the final effort of the recently deceased F. S. Earle, for many years the recognised leader of the West Indian school of scientific sugar-cane agriculturists, and probably the world authority on sugar-cane varieties.

Earle was an eminently practical man, and the book is written in a simple direct style which should appeal to all practical agriculturists. As he remarks in the preface, "Frankly the atmosphere of the book is that of the canefield rather than that of the research laboratory."

The book is divided into two parts. Part I. deals with the history of sugar-cane: its propagation, structure, pests, and diseases; while Part II. deals with the cultivation of sugar-cane. The chapters on the diseases and insect pests are very wide in their scope, and in the case of the chapter on diseases the attached bibliography is very comprehensive and valuable. Unfortunately, the descriptions of the symptoms of the diseases are not as full as they should be. Mosaic disease and the root rot complex are given particular attention, and the essays on these two subjects are particularly informative, though there are some inaccuracies in dealing with those varieties and diseases which are more or less confined to Australasia. Part I. also contains a key for the identification of all the important present-day varieties of cane, together with a description of each variety and its agricultural characteristics.

In the section devoted to the cultivation of sugar-cane, one chapter deals with the classification of soils in a very general way, and chapters are devoted to the preparation of the land and systems of planting. These subjects are discussed from the practical rather than the scientific viewpoint, and should prove very useful to planters in the West Indies.

There are two appendices. Appendix I. contains an annotated list of all the varieties which have been recorded up to the present time, while Appendix II. gives a brief summary of the main features of the sugar-cane industry in the more important sugar-producing countries.

The book will, no doubt, become a standard reference book on the subject of sugar-cane varieties, and the treatment of this subject is its outstanding feature. It is a work that can be well recommended to both the farmer and scientific agriculturist. Our copy is from the publishers.—A.F.B.

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## PIONEER DROVERS.

Mr. W. H. Rudd, junior, of Kingsborough, Aramac, Queensland, in a letter to the editor of the "Pastoral Review" (September) comments as follows on an article entitled "Pioneer Drovers" in the July issue of the "Review," and which was reprinted in this journal:—

"In July issue Mr. S. E. Pearson, whose writings I enjoy each month, is not right when he says, under "Pioneer Drovers," that Walter Rose has been keeping a hotel in Cloncurry. That is about the last job he would tackle. Latest news I heard of him this year was superintending a bangtail muster on Avon Downs—the sort of job he knows. The "Bed of Roses" in Cloncurry is kept in order by Walter Rose, a nephew of old Walter.

"Mr. Pearson has also confused Blake Miller, of Undilla, with the late Jack Miller. It was Kidman and Miller, of Austral, but "Johnnycake" Jack Miller (who passed away a couple of years ago in Urandangie)—not Blake.

"Blake was on the Murranji track, and they married two sisters, Misses McCaw, of Urandangie—also were both with Kidman—so it is an easy mistake."

# NOTES ON THE SHEEP BLOWFLY.

By J. CAREW, Senior Instructor in Sheep and Wool.

When investigating the blowfly trouble in the Central District recently, I found that most of the graziers were relying on crutching and dressing, or shearing the sheep in order that they would be in a more suitable state to resist the fly.

The fly is usually attracted to the sheep by moisture, and by shearing or crutching the moist or dirty wool is removed, therefore the sheep are not so attractive to the pest.

In many cases, however, it was found that from one to three weeks after crutching the sheep were blown to the extent of from 10 to 20 per cent. of given mobs. It would therefore appear that crutching did not give the amount of protection desired. Shearing is an advantage, as the maggots do not get all the protection they require; still, cases were met with where three weeks after shearing the flies were again attacking the sheep.

Those who were in charge of large flocks and depended on jetting as a protection for the sheep were the men who were emphatic about the advantages gained by this method.

In dealing with the fly, the most effective method should be adopted, for, whatever the treatment, it is a cumbersome and costly business.

Cases were met with where those in charge expressed themselves as being quite confident that jetting is the best means of coping with the trouble; in fact, the opinion is widely held that it is the only means that could be relied on to protect large flocks. This is also the opinion of the Committee of Investigators who conducted the experiments under the Council of Science and Industry at Dalmally; and they considered that jetting with a solution consisting of 7 lb. arsenic with an equal quantity of carbonate of soda to 100 gallons of water gave 90 per cent. protection for three months.

Weather is an important factor, but it is regarded that the quantity of arsenic in the solution jetted into the breach is the ingredient giving the protection. Many dip mixtures are on the market, those containing arsenic being the most suitable.

All who are getting satisfactory results from jetting are satisfied that the secret of success is that the mixture must be sufficiently strong to kill the maggots, and that it must be properly jetted with sufficient force to penetrate to the skin in sufficient spread around the breach and tail, as mostly all attacks are confined to these parts.

The pressure necessary varies according to the length of wool, from 160 lb. per square inch for ten months' growth to 60 lb. per square inch for crutched or shorn sheep. The longer the wool, the greater the amount of solution retained, thus giving a greater amount of protection to the sheep.

For a small flock of 500 sheep up to 5,000, a hand-pressure pump may be used, but for larger numbers the power plant is the most suitable. Among those who had experience with all methods and now consider the jetting as giving the greatest amount of protection is Mr. B. Barton, manager, Baratria Station, Chorregon, Winton line, who states that, provided the jetting mixture is correct and properly applied, he has every confidence in its being the best means of protecting large flocks of sheep.

There are erected on Baratria Station three elevated races, which are the cheapest and simplest I have seen in use, allowing for quick handling with a minimum of labour, and quite as efficient as any other style for thorough application. It consists of an elevated race 3 feet 6 inches above ground at the highest point, just ahead of where the jetting takes place. It is fitted with two sliding and one swinging gate. The swing gate forms part of the race. When the sheep to be jetted passes this swinging gate the sliding gate is pushed across the race to hold it while being jetted. The man feeding the jetter draws the swing gate across the race by means of a rope attached to the top of the gate and led back along the race through a pulley at the opposite side. When the sheep is jetted the operator opens the sliding gate by means of a long lever, and also the swing gate; in this way the jetted sheep is followed by its successor, the sliding gate holding it in position.

The race is 16 inches wide, and is floored with 3 inches by 1¼ inch battens spaced ¾ inch apart. The uprights may be of bush timber, but 3 inch by 2 inch sawn timber is most convenient for working, and can also be used to carry the cross battens in the runway. The race is 50 feet in length, including the ramp, which is 14 feet in length and tapers from 6 feet in the yard to 16 inches at the entrance of runway.

While I was present Mr. Barton jetted 180 sheep in twenty-five minutes, using 50 gallons of mixture. Four men were keeping the sheep up to him.

Plate 149.—Gypsy Countess 44th (R. A. Howell), Champion Devon Cow. Royal National Show, 1929.

Plate 150.—Baronet (R. A. Howell), Champion Devon Bull. Royal National Show, 1929.

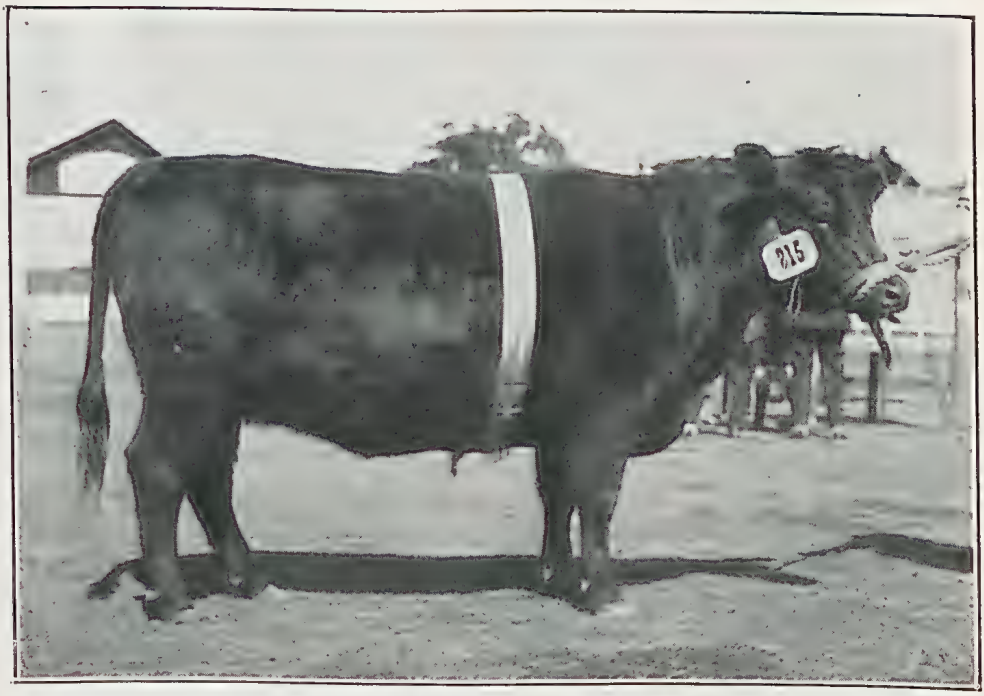


Plate 151.—Highland Maid of Talgai (G. C. Clark), Champion Poled Angus Cow. Royal National Show, 1929.

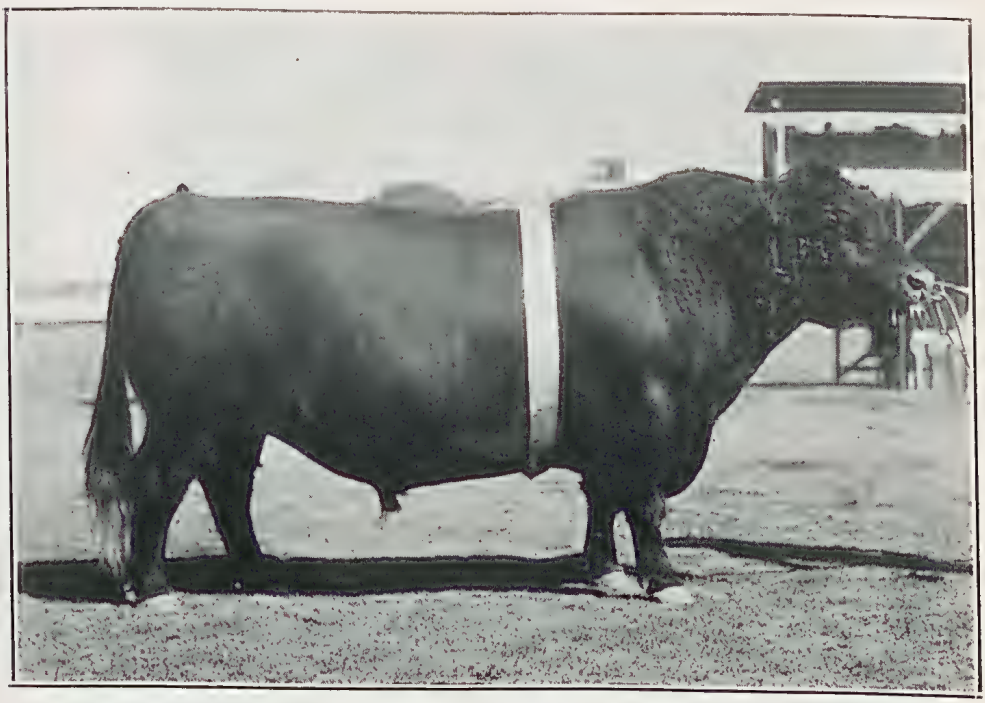

Plate 152.—Trooper Burgess (I. M. Newman), Champion Poled Angus Bull. Royal National Show, 1929.

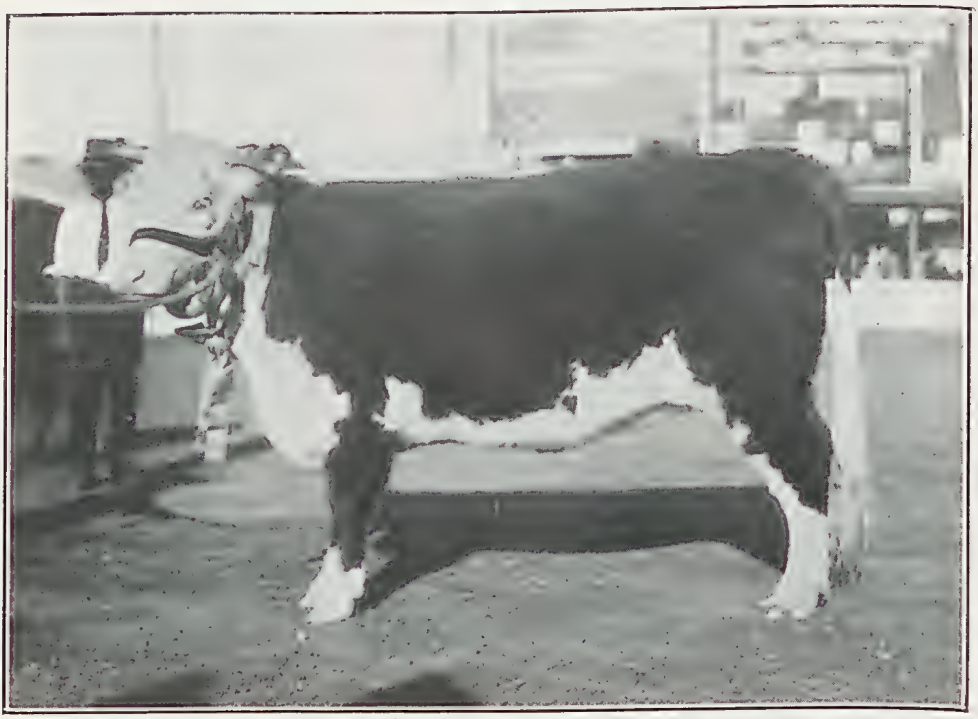

Plate 153.—Princess Mary (Morris and Reynolds), Champion Hereford Cow. Royal National Show, 1929.

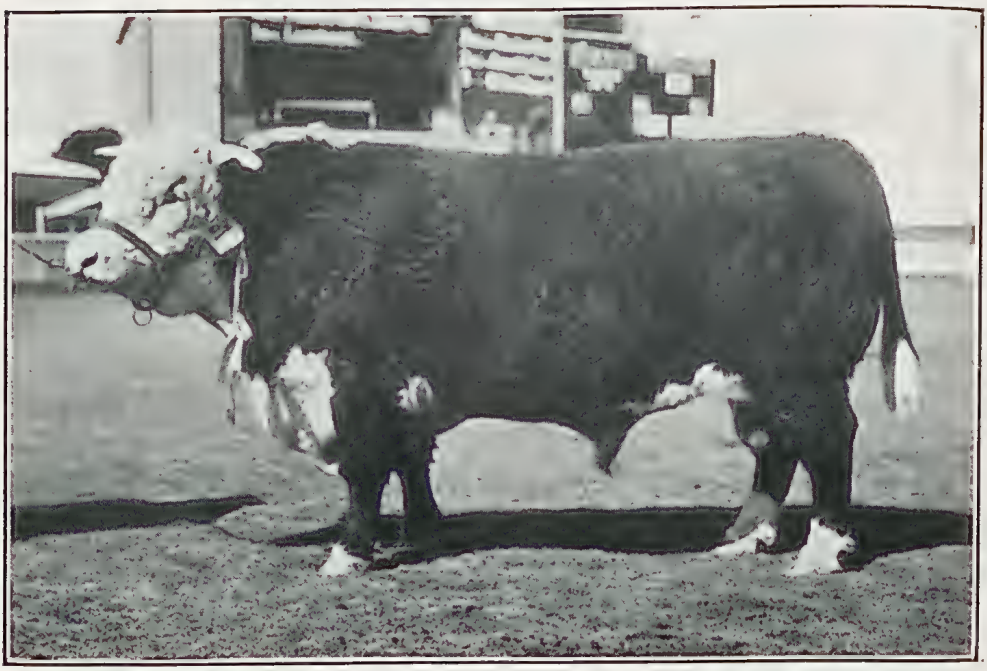

Plate 154.—Hobartville Forest King (S. N. Innes), Champion Hereford Bull. Royal National Show, 1929.

Plate 155.—Claredale Billy, Champion Ayrshire Bull. Royal National Show, 1929.

Plate 156.—Trinity Darby, Champion Jersey Bull. Royal National Show, 1929.

Plate 157.—St. Athan Actuary, Champion Friesian Bull. Royal National Show, 1929.

Plate 158.—Lord Kitchener, Champion I.M.S. Bull. Royal National Show, 1929.

Plate 159.—Wollongbar Monarch (A. E. Gillespie), Champion Guernsey Bull, Royal National Show, 1929.

Plate 160.—The Entrance to the "Valley of the Giants," Brisbane Show, 1929.

This realistic replica of a section of Satinay Forest on Fraser Island was one of the most interesting pavilion displays at the recent Royal Exhibition.

# LUNG WORMS IN CALVES.

By A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

This affection is known as verminous bronchitis, hoose, or husk. The worms found in the lungs are the *Strongylus micruris* and *Strongylus pulmonaris*. The former are the larger, being about 1 to 3 in. long; whilst the latter is only ⅔ to 1½ in. in length. This disease has been known since the year 1744, when Ruysch discovered worms living in the air passages of calves. Nicholls also refers to the same disease in 1756, when it assumed an epizootic form in England.

## Symptoms.

If the worms are not very numerous, one notices an occasional husky cough; and, if the animals are driven or excited, the breathing may appear short and hurried. The disease gradually spreads from animal to animal until the majority exhibit this peculiar cough or hoose. After a few weeks, the cough becomes more frequent, and appears to be suffocating the animals—in some cases suffocation actually takes place. A frothy liquid sometimes streaked with blood is discharged from the nostrils. This discharge contains eggs, also embryo and mature worms. The movements of the worms are easily recognised, particularly when placed in a little warm water. The calf loses condition and strength; the mucous membranes of the eyes and mouth become very pale in colour; eyes sunken; skin hidebound, dry, and scurfy; the hair staring; and occasional diarrhœa. The animal wanders away from the others, and is found lying down apparently listless and poverty-stricken. The duration of the disease varies according to the number of worms present and the general condition and constitution of the animal. Some cases only last two or three weeks, whilst others survive for several months.

Upon *post-mortem* examination the worms can be found in the air tubes, the lining of which is inflamed; and the lungs frequently have a somewhat mottled or patchy appearance.

## Prevention.

Healthy calves should be kept from paddocks where infested animals have been, but horses and sheep can be turned into them with safety. The land, if damp or boggy, should be drained; waterholes are a great source of infection, and should be avoided, if possible; buckets or troughs are better, as these can be frequently cleansed and disinfected. Keep up the strength of the animal by giving good nutritious food, and allow constant access to salt, because salt destroys the young worms as they are taken into the animal's body. Animals dying from this affection should be thoroughly burned or buried deeply.

## Treatment.

The quickest and most reliable treatment is to inject a solution directly into the trachea (windpipe). Various solutions have been used; but the following is recommended, and is the dose for a calf:—

| | |
|---|---|
| Oil of turpentine | 1 drachm. |
| Carbolic acid | 10 minims. |
| Chloroform | ½ drachm. |
| Glycerine | 1 drachm. |

To be thoroughly mixed together before using each dose; then slowly injected by means of a syringe into the windpipe.

The needle of the syringe is inserted between the rings of the trachea (windpipe) about half-way down the neck. Some people advocate making a small incision in the skin with a clean knife before inserting the needle; but, if the needle is fairly thick and carefully handled when being pushed through the skin, it will be found unnecessary to incise the skin. This injection causes considerable distress to the animal by setting up paroxysms of coughing; but it passes off without setting up serious irritation, and is effective in destroying the worms.

In bad cases it is advisable to repeat the injection on two or three occasions, allowing some three days' interval between the injections; but in many cases one injection will be found sufficient.

If it is impossible to procure a syringe, a drench composed as follows can be given, but its action is not so effective:—

| | |
|---|---|
| Oil of turpentine | ½ oz. |
| Creosote | ½ drachm. |
| Tincture of camphor | ½ oz. |
| Milk or linseed oil | 4 to 6 oz. |

This drench should be given once or twice weekly for some three or four weeks.

Sheep, and particularly lambs up to twelve months of age, are similarly affected with worms in the lungs, although not the same worms as found in calves. The treatment described in these notes will be found just as effective, except that the dose of medicine given is considerably smaller—viz., about one-quarter to one-half of the above doses.

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## THE QUEENSLAND CHEESE INDUSTRY.

### A SCIENTIFIC INVESTIGATION.

A scientific investigation is to be made in Queensland into the manufacture of cheese with a view to the permanent maintenance of the cutput at the highest grades, and for this purpose a special committee consisting of Professor J. K. Murray, B.Sc. (chairman), and Mr. C. McGrath (Chief Government Dairy Expert) has been appointed.

This action has been taken at the instance of the Minister for Agriculture and Stock (Mr. H. F. Walker), who announced recently that the terms of reference to the committee would include the following requests:—

(1) To investigate the circumstances connected with the reduction in the percentage of gradings of cheese as choice and first grade, commencing from the month of October, 1928, and continuing to April, 1929.

(2) To watch any developments in the 1929-30 summer of a similar character.

(3) To ascertain the causes thereof, and to suggest remedies therefor.

(4) To make any other suggestion which would tend to the improvement of cheese manufacture in Queensland.

Mr. Walker said that he was desirous of affording every possible encouragement to that important section of the dairying industry which was concerned in the manufacture of cheese. Queensland produced more cheese than any other State of the Commonwealth. The figures for the year ended on 30th June, 1928, showed that the Australian production was approximately 30,000,000 lb., of which Queensland produced about one-half. Queensland was responsible for the Commonwealth's export of cheese. A good reputation had been established for Queensland cheese on the world's market, although improvement had been shown to be possible in certain directions. In recent years efforts had been made to stimulate the consumption of cheese in Australia, which at 3½ lb. per capita was considerably less than that in many other countries; for instance, in the United States of America the consumption per capita was approximately 5 lb., and in the United Kingdom it was 9¾ lb.

His attention had been drawn to the fact that last summer the grading of cheese showed a tendency for choicest and first qualities to be reduced in percentage in certain months, and for the quality again to improve after the new year. As some difficulty was being occasioned manufacturers in this connection he had decided to assist by instituting a scientific investigation. A special committee had, therefore, been constituted of Professor J. K. Murray, B.Sc. (chairman), and Mr. C. McGrath, Chief Dairy Expert, with power to add to their number, and co-opt the assistance of any persons considered advisable.

He hoped that the committee of investigation would be successful in locating the cause of the trouble, and that generally its investigations would be of benefit to the industry. He had asked the Cheese Board and the Cheese Manufacturers' Association to co-operate with the committee in making all necessary information available, and he felt sure that this co-operation would be forthcoming.

## GRAIN EXPERIMENT PLOTS ON THE DOWNS.

*Mr. H. F. Walker, Secretary for Agriculture and Stock, has received the following report (29th August, 1929) from the Director of Agriculture, Mr. H. C. Quodling:—*

In company with Mr. C. S. Clydesdale, Agricultural Instructor, an inspection was made in the last week of August of several Departmental wheat, barley, and oat experiment plots in different parts of the Darling Downs.

### Flag Smut.

In consequence of the occurrence of Flag Smut in last year's wheat crop in practically every district, a fact confirmed by officers of the Field Staff of the Department deputed at the time to carry out the necessary inspection, experiments were designed this year by the Plant Pathologist to determine the susceptibility or otherwise of the more commonly-grown varieties to the disease, plots for this purpose being established at Roma State Farm and at Allora. Although the wheat in the plots is not very advanced, the disease has already appeared as a result of the artificial infection of the seed, indicating its rather serious nature. Last year the Department supplied practically all wheatgrowers with information concerning the disease, and the methods recommended to keep it in check. At the present early stage of growth of this year's wheat crop, it would be difficult to readily detect the presence of the disease even if it were present. However, it is rather improbable that crops will be quite free from Flag Smut this season, as its presence was noted late in August in the Allora district in a rather promising, well-grown, forward crop.

### This Season's Wheat Crop.

Observation was also made over the section of country traversed of the general condition of this season's wheat crop, which, generally speaking, is looking remarkably well, the early-sown areas being particularly promising as a result of two light, but very opportune, falls of rain in the course of the month. The area cropped this season appears to be fully equal to that of last year, and, if satisfactory growing conditions continue, a good harvest seems assured. At the present time, crops which give the best promise are those planted on early and well-prepared land, which had been summer-fallowed.

Plenty of sub-soil moisture, as a result of this practice, was found in the areas systematically prepared and cultivated, affording unmistakable evidence of the value of good cultivation to trap and conserve moisture; the shallow working of the rich, heavy black soils of the Darling Downs proving a very satisfactory method of tillage.

### Wheat and Sheep.

Judging by the inquiries made at the Department by graziers on the Downs, some of which were recently followed up by personal visits, there is every indication that several sheepowners intend breaking up and cropping a portion of their holdings, with a view to providing green fodder for ewes and lambs; also for fattening sheep for the market. Obviously, there is almost unlimited scope on the Darling Downs for expansion in this direction, and if the practice were universally followed it would undoubtedly assist in stabilising the sheep-raising industry in this favoured portion of the State.

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## EFFECT OF METALS ON MILK.

An interesting and important paper on the effect of various metals on milk and milk products by Professor Hunziker was read in the course of the recent World's Dairy Congress week in London.

The investigations involved a study of the resistance to corrosion of nineteen different metals—plated metals and metallic alloys—to the action of sweet and sour milk and cream; of the individual organic acid contained in milk and cream; of numerous washing-powders and chemical sterilisers; and of sodium and calcium brine. The investigation included the effect of these metals on the flavour and physical properties of the milk and milk products. The following conclusions have been arrived at as a result of the investigations:—

1. Zinc, iron, galvanised iron, and copper proved utterly unsuitable metals for dairy factory equipment. They not only corroded profusely, but developed in the milk product objectionable flavours with unfailing regularity. These off-flavours were chiefly of the metallic flavour character. These tests emphasise the fact that much of the metallic cream that arrives at the creameries is due to rusty cream cans, and that the preservation of the tin coating on the inside of the can is an exceedingly important factor in controlling the quality of the cream.

2. Nickel silver, Monel metal, and poorly-tinned iron also injured the flavour of the milk, though the flavour defect was not so pronounced, and the loss in weight due to corrosion, while considerable, was not as great as in the case of the metals under Group 1. These metals are unsafe for use in the construction of milk plant and creamery equipment. Monel metal proved somewhat more resistant to corrosion and less damaging to the milk product than nickel silver.

3. The ordinary chromium steels, such as Ascoloy and Enduro, and also aluminum and aluminum manganese alloy, proved quite resistant to corrosion, and in most cases harmless to the milk product. Ascoloy and Enduro, however, while resistant under most conditions up to a certain point, pitted and rusted freely under severe conditions. Enduro showed somewhat greater resistance than Ascoloy. This suggests that these ordinary chromium steels are not safe alloys to use in dairy factory equipment.

Pure aluminum had no appreciable effect on any of the milk products excepting very sour milk, such as acidophilus milk, in which it developed a slightly metallic flavour. Likewise, its resistance to corrosion, excepting in the presence of alkalies, was generally good. The greatest weakness of aluminum is its high corrosiveness in contact with alkalies, such as are contained in the washing-powders and in alkaline brine. In the case of sodium carbonate and sodium brine, the resistance of aluminum may be very greatly augmented by the addition of a small amount of sodium silicate. Aluminum is being used advantageously in European factories for milk storage tanks and milk shipping cans.

4. Nickel, tin, and properly tinned copper carried no noticeable off-flavour in the milk product, and their loss in weight due to corrosion was comparatively small. These metals, while also slightly soluble in lactic acid, may be considered safe metals for use in milk plant and creamery equipment as far as their effect on the flavour of the milk product is concerned. The tin proved more nearly completely inert than the nickel, which tarnished readily and caused a slight off-flavour in acidophilus milk.

5. Allegheny metal, which is a special chromium-nickel-steel alloy, proved superior to any of the other metals studied. It had no effect on the flavour of any and all milk products, and it suffered no loss in weight, and showed no visible signs of corrosion in organic acids, sweet and sour milk and cream, alkaline washing-powders, and brines. This alloy promises to play an important role in the construction of our future dairy equipment.

6. The presence of two or more metals in the same piece of dairy equipment is fundamentally undesirable. Most metals used may differ in their electrical potentials, and this in turn invites corrosion and impairment of flavour by electrolysis. For similar reasons impurities in metals, as for instance, impure aluminum, such as cast aluminum, also copper alloys and imperfectly tinned iron and copper, are equally unsatisfactory.

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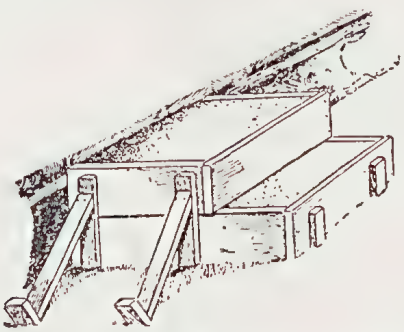
## CONCRETE STEP FORM.

Concrete is far superior to any other material for making steps to the house and outbuildings. Wood steps soon decay and settle out of shape. In making concrete steps only a very simple form is required. The sketch shows clearly just how to make a good form with a small amount of material. One inch material is used in making the form, which is braced and staked as shown to prevent bulging when the concrete is poured in.



This type of form can be used for any number of steps, as it is really a series of separate forms one upon the other, each form being shorter than the one below to give the desired tread.

## IMPORTATION OF STUD STOCK.

*Extract from Commonwealth "Hansard," August,* 1929:—

Mr. Josiah Francis (Queensland) asked the Minister for Markets and Transport, upon notice—

(1) Is there now any prohibition of the importation of stud stock into Australia from Great Britain and Ireland owing to foot and mouth disease?

(2) What are the details of the assistance offered by the Government to the primary producers of Australia to facilitate the importation of approved stock for stud purposes?

Mr. Paterson: The answers to the honourable member's questions are—

(1) The importation of stud stock into Australia is, for the present, permitted subject to certain quarantine conditions.

(2) The following are the main points of the Government's proposals regarding the importation of pedigree stock from Great Britain and Ireland:—

(*a*) The shipping companies, with one exception, have agreed to carry such stock freight free.

(*b*) All other incidental expenses connected with the transport of the stock from the port of export in Great Britain to the port of importation in Australia to be borne as follows:—

(i.) One-third by the purchaser;

(ii.) One-third by the Commonwealth and State Governments concerned in equal proportions;

(iii.) One-third by the Empire Marketing Board.

(*c*) Any breeder who receives financial assistance under the scheme must not dispose of the stock within two years of the date of its importation. Should he sell during that period he must refund the amount of any assistance granted to him.

(*d*) The scheme will operate for a period of two years.

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Group of Exhibitors, Officials, and Enthusiasts at the Pig Section at the Brisbane Exhibition, 1929.

*See Plate* 161.

*Front Row* (left to right)—W. F. Kajewski (Glencoe); B. V. Neale (Cambooya); C. W. Krause (Marburg); H. H. Sellars (Tabooba); G. F. Davidson (North Arm); H. Franke (Cawdor); D. Wells (Kureelpa); Mr. ———— with Shepperson, of Kin Kin; W. Elton, junr. (Cambooya); C. W. B. Young (Lagoon Pocket).

*Second Row* (left to right)—W. W. Elton (Cambooya); R. G. Watson (Kingston); C. G. Dale (Lagoon Pocket); T. Price (Goodna); E. J. Shelton, H.D.A. (Department of Agriculture and Stock, Brisbane); J. P. Bottomley (Chief Steward, Pig Section); H. J. Keevers (Burra Burra, N.S.W.); C. C. Low (North Arm); Mrs. Dalton (Birkale); Mrs. and Mr. A. Alford (Traveston); H. Severns (Gatton College); S. Whittaker (Casino, N.S.W.).

*Third Row* (left to right)—L. A. Downey, H.D.A. (Department of Agriculture and Stock, Brisbane); F. W. Martin (Stock Agents Ltd., Brisbane); J. J. Slack (Ipswich); T. M. Wallace (Dinmore); W. Kennedy (Kingston); A. Wells (Kureelpa); G. H. Naumann (Pinkenba); W. Walker (Lamington); J. T. Griffiths (Kingaroy); R. Turpin (Manly); A. F. Conochie (Tingoora); Geo. White (Steward, Pig Section).

*Two Back Rows* (left to right)—E. L. Melville (Prior's Pocket); M. Porter (Wondai); P. V. Campbell (Lamington); Mr. Scarabelloti (Nashua, N.S.W.); Assistant to A. F. Conochie; Mr. Buckley, junr. (Beaudesert); D. R. Laws (Chermside); Arthur Brown (Toogoolawah). *At back*)—A. V. Shepperson (Kin Kin); H. A. Proposch (Maclagan); W. Koehler (Yamsion); T. J. Handley (Murphy's Creek); L. Skerman (Kaimkillenbun).

PLATE 161.—GROUP OF EXHIBITORS, OFFICIALS, AND ENTHUSIASTS AT THE PIG SECTION AT THE BRISBANE EXHIBITION, 1929.
(For list of names, see page 440.)

# SOME EXTERNAL PARASITES OF THE PIG.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

In an interesting article on "Some External Parasites of Swine" in the "Pig Breeders' Annual, 1929-1930," and from the pen of Mr. K. D. Downham, Adviser in Veterinary Science at the University of Liverpool, emphasis is laid on the fact that lice cause considerable loss to pig breeders. It has been estimated that 2 to 6 per cent. of the market value of a pig is lost, due to the presence of these parasites. Each time a louse feeds it punctures the skin of the pig and withdraws its blood and lymph. The irritation is severe, particularly if the animal is heavily infested, and in addition to the loss of blood, the fact that the animal's rest is constantly disturbed is prejudicial to growth and fattening. Mr. Downham states that swine which are attacked by lice in large numbers become unthrifty, suffer from lowered vitality, and thus become more susceptible to diseases and attacks by other parasites.

All this is borne out in Australian experience where lice are just as plentiful and as active as they are in countries overseas. In fact, it is quite possible lice cause more trouble here, for pigs are kept in the open much more than overseas and they usually receive considerably less attention, though this latter fact is to be regretted, as neglect and carelessness are responsible also for very severe losses.

Describing some of the parasites, Mr. Downham states that the hog louse (*Hæmatopinus adventicus*) is a blood-sucking parasite one-sixth to one-fourth of an inch in size (this parasite is also known as *H. suis*); the female is larger than the male and can be distinguished from it by the absence of a dark line on the underside of the abdomen, along the middle of the last three segments, which is a feature of the male. Lice possess six legs, and their feet are adapted for clasping the hairs or bristles of the pig. The female lays about 100 eggs during her life, these being deposited on the hair close to the skin and firmly adhere to the hair or bristles by a glue-like substance. The eggs hatch in about a fortnight and the young lice soon find the tender parts of the skin for feeding, a favourite site being the under surface of the ear, particularly in cold weather. Maturity is reached when the young lice are ten days old, and the young females commence to lay eggs at twelve days old. The whole life cycle is passed on the pig. Infestation occurs from contact of infected animals with clean animals. The parasites do not live more than a day or two off their hosts. The hygiene of the pig and its habitation should receive attention. The ears should be cleaned out with a mixture of pine tar, two parts, and cotton-seed oil, one part, or crude petroleum. Swabs soaked with the liquid should be used for the ears, the under surface of the body, and between the thighs. The side and back of the animal should be sprayed with crude petroleum by means of a watering can or a can with a flattened spout. Large herds heavily infected should be dipped; any of the preparations recommended for sheep scab may be used for this purpose. Dipping should be done in warm weather. It is a good plan to have an ear inspection once a month during the winter to keep down these parasites.

## Mange Mites.

Mites belonging to two genera cause mange in swine, *Sarcoptes scabici suis* and *Demodex folliculorum suis*. These parasites spend their entire life on the host and live on the blood and tissues of the animal they attack.

The body of the Sarcoptic mite is rounded above and flat below. Its size is about one-fiftieth to one-sixtieth of an inch. The thoracic and abdominal regions are more or less united, the epidermis is transversely striated, and bristles are present on the back. The mandibles are shaped like a crab's claw. They possess four pairs of short thick legs. In the male the hind legs are equal in length, suckers being present on the first two pairs of legs. The males are smaller than the females. If the mites are placed on a dark background they are just visible to the naked eye, but a lens or the low power of a microscope is necessary for identification.

The female mange mites burrow into the skin and lay eggs in the burrows. In from three to ten days the eggs hatch and the young mites, after moulting several times, begin to lay eggs in ten or twelve days. By this time they are near the surface, due to the normal shedding of the epidermis and to the rubbing of the infested animal. The young mites then maks fresh burrows in the under surface of the skin and repeat the process. The irritation is severe, and the sensitive areas become inflamed and swollen. The swollen areas are larger than pinheads and have dried serum adhering to them. As the number of mange mites increase the raised areas become closer together, the hairs fall out, scabs are formed which rub off, and the serum oozes out and often a raw surface is left. Later the skin is corrugated, and in chronic cases wrinkles are left. If badly affected the animals become emaciated, and if left untreated will die.

Fig. 1. The Pig Louse (Female).
*(From "A Text Book of Entomology." W. S. Patton and F. W. Cragg, 1913.)*

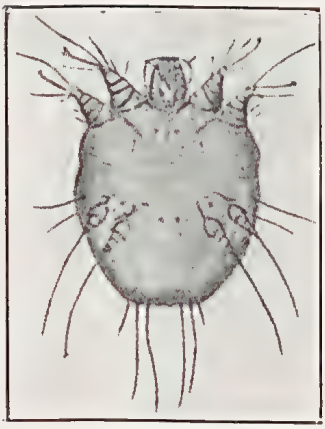

Fig. 2. *Sarcoptes major var. Suis. S. Sarcoptes squamiferus.* Female. Abdomen. Magnif. 75.

Fig. 3. *Sarcoptes major var. Suis.* Male. Abdomen. Magnif. 75.

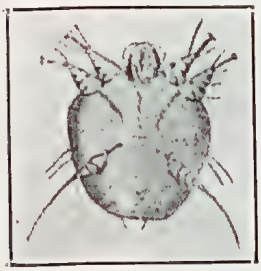

Fig. 4. *Sarcoptes major var. Suis.* Nympha. Magnif. 75

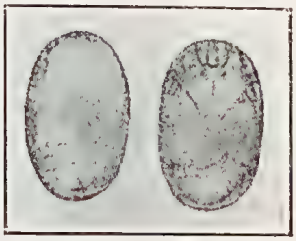

Fig. 5. *Sarcoptes major var. Suis.* Eggs, the contour of the embryo showing. Magnif. 75.

*(Figs. 2, 3, 4, and 5 from Hytyrá & Marek's "Special Pathology and Therapeutics of the Diseases of Domestic Animals.")*

Plate 162.—External Parasites in Swine.

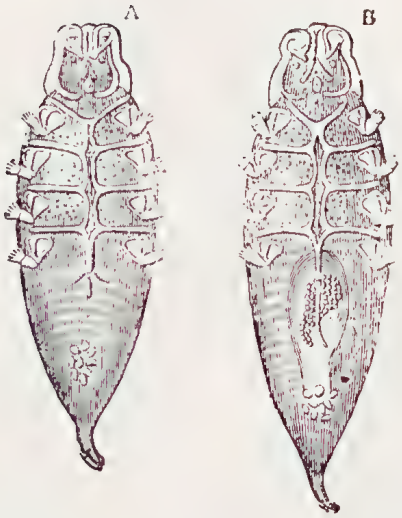


Fig. 6. Demodex of the Pig, seen on the ventral surface; magnified 250 diameters.—Csokor.

A, male; B, female, with an ovum visible in the abdomen.

*(Reproduced from Neumann's "Parasites," by permission of the publishers.)*

Fig. 7. *Sarcoptic scab* in the pig.

Plate 163.—External Parasites in Swine.

Diagnosis consists in finding the mites by means of scraping the affected parts of the skin with a blunt-edged knife and examining the scrapings under a magnifying glass or by treating the scrapings with a hot 10 per cent. solution of caustic potash and examining under a microscope.

Sarcoptic mange is contagious and is generally spread directly by contact of one infested animal with another. Man may become infected and extreme irritation results for about thirty days, but the mites will not live much longer than that on another host. Crowding and unclean conditions predispose to the rapid spread of the disease. Weak, unthrifty animals are more prone to mange than healthy ones, and pigs fed upon a vitamin-deficient ration are very apt to suffer from this and many other diseases. The mites do not multiply after leaving an animal, but remain alive for two or three weeks or longer, and their eggs can survive for nearly as long under suitable conditions.

Pigs suffering from Sarcoptic mange should be treated with (1) crude petroleum, (2) cotton-seed oil and kerosene in equal parts, or (3) kerosene and lard, 1 half-pint of the oil to 1 lb. of the lard. These preparations may be applied with a brush or cloth and rubbed well in. Freshly treated pigs should not be allowed to become chilled, should not be moved rapidly, or subjected to strong sunshine. All litter should be destroyed by burning and the sty thoroughly disinfected before using for healthy pigs.

### Demodectic or Follicular Mange.

This is caused by a very small mite, *Demodex folliculorum suis*. It is wormlike in shape; the cephalo-thorax is followed by a transversely striated abdomen which gradually tapers towards the end. It is about one-hundredth of an inch in length; the male is smaller than the female. These parasites are found in the hair follicles and sebaceous glands of the skin, where the whole of the life cycle is completed. The parts of the pig's body most favoured by the parasites are the under parts of the head, neck, and abdomen and inside the thighs. The lesions often commence round the snout and the eyes and spread to the surrounding parts. The parasites are generally found in clusters and cause pustules, which often run together and form cavities and scales. If badly affected, pigs will become unthrifty, and septic sores and scabs on the animal appear and give an opportunity for bacteria to gain an entrance to the skin. The condition is not a very common one in swine, and is more serious in the dog; other animals affected may be cattle, goats, and man. The best method of treatment for pigs affected by these parasites is the regular application of crude petroleum to the affected parts.

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## WHAT EVERYBODY WANTS.

### A TALK TO PIG FARMERS.

In an interesting and informative set of booklets published by the National Pig Breeders' Association of England, dealing with several of the most prominent of the British breeds of pigs, an introductory paragraph calls attention to the requirements of each individual section of the pig industry under the caption of "What Everybody Wants."

We reproduce the story here with the permission of the association, of which Mr. E. J. Shelton, the Senior Instructor in Pig Raising in Queensland, is an honorary member.

### What the Breeder Wants.

The pig breeder wants hardy, long-lived animals with such good constitutions that he rarely has to open his medicine chest or call in the veterinarian. They must be active, contented foragers, willing to cut down the food bills by picking up a good proportion of their keep from the pasture. (This is important too, especially here in Queensland where pig raising is an adjunct to other branches of farming.)

Both boar and sows must be prolific and ready breeders, the litters must be large, and each pigling a strong and quick grower (slow growers and unprofitable sorts are all too common and are distinctly unprofitable and should not be tolerated.) Both stores and breeding animals must have the right conformation of good butchers' pigs in order to command the highest possible prices. They must be of firmly established

Plate 164.—"Yamsion Flower," Champion Duroc-Jersey Sow, Royal National Show, 1929.

Plate 165.—"Homeville Teller," Champion Poland-China Boar, Royal National Show, 1929.

type, so that a litter shows uniformity in all points (all very desirable features here as well as in England). We have a long way to go in Queensland before we can claim to have a maximum of the very best types, but there has been a vast improvement in recent years, and the improvement still goes on. The distribution of stud pigs from stud sales like those held annually at Brisbane Exhibition is a special feature and one well worth all the encouragement breeders can focus on them.

### What the Feeder Wants.

Continuing the story, the N.P.B.A. states that the feeder wants only pigs in hard (or as we call it, growthy) condition and with keen appetites (a pig with a poor appetite is a poor pig indeed).

They must have been weaned in strong-growing condition and be able to go straight on to pasture or into yards until it is convenient for him to put them in sties for a quick finish. (The Departmental pamphlets, "Weaning the Pig" and "Flushing the Breeding Sow" deal with these features, and should be in the hands of every farmer.) These feeder pigs must stand sty feeding well and eat without fads or fancies or aches and pains. Above all, they must be able to put on weight quickly and in the proper parts (a study of the results obtained by members of the Queensland Boy and Girl Pig Clubs indicates that many junior farmers are obtaining results even better than those obtained by many of the senior farmers along these lines). The feeder is always on the lookout for pigs light in the front, with fine shoulders, a straight level back and a good back end (or loin and hams, as we refer to them in Queensland, where also the demand is constant and improving for the correct type of pork and bacon pig, and where top prices may always be obtained, provided the pigs are of correct weight and in good marketable condition).

### What the Pork Butcher Wants.

The N.P.B.A. booklets state the maximum live weight for a porker is 120 lb., the minimum, say, 80 lb., a good average being 90-100 lb. (As porkers these average live weights are O.K. for Queensland conditions, where it is usual to consider around 30 per cent. a fair deduction from live weight at trucking station in country districts —often far removed from the slaughtering establishments—to dressed and "cooled off" weight at the factory.) The London pork market, which takes approximately a million carcasses a year, prefers the smaller weights (as also is the case in Queensland) and pays the best prices for them. The pigs must be long, well-proportioned, broad and full along the back, with the tail well up. The cheap parts of the carcass, particularly at the fore end, have to be light, and the more expensive joints well developed with fair length of loin. The fat must be white and firm and in moderate proportions to the lean, so that the necessity of trimming is avoided. (Queensland pork buyers like these pigs too, as also do bacon curers, and would willingly pay top prices for more of them if they were available continuously all the year round.)

The small porker must be quick growing in order to be plump, neat, light, and full of meat, but not too fat. Porkers with fine hair, thin skins, and absence of wrinkles sell better than coarse, rougher-looking pigs in all markets. (This is so in Queensland also, where we are certainly becoming more particular every year.

### What the Bacon Curer Wants.

The N.P.B.A. indicate that the British bacon curer wants pigs between 160 and 210 lb. that kill well and with a small percentage of offal. (For Queensland markets these weights are far too heavy. The pamphlets, "Pig Raising in Queensland—Some Economic Phases" and "Trade Classification of Pigs" deal with Queensland conditions, and to these pamphlets our readers are specially referred.) The bacon curer dislikes paunchy baconers, because they kill wastefully. The pigs must be long in the back, so that the sides cut up with deep, heavy "middles." (Sides of bacon are not a trade line in Queensland, but the remarks apply with full force to the cuts popular here, viz., flitches, middles, and hams.) The carcass must show a high proportion of lean to fat with full, thick, firm underline. The meat must be in the right place—that is, mostly behind the spare rib, the forequarter being proportionately light. A heavy jowl and broad coarse shoulders are wasteful and lose money( the heavy-shouldered pigs are equally undesirable here). The ham must be long and wide, with meat right down to the hocks. A fine skin, free from coarse wrinkles and with long straight hair is considered to indicate in the live pig plenty of lean flesh and fine but hard bone. (There is a good demand in Queensland for pigs carrying all the good points referred to herein.)

Plate 166.—"Glenburra Duke," Champion Berkshire Boar, Royal National Show, 1929.

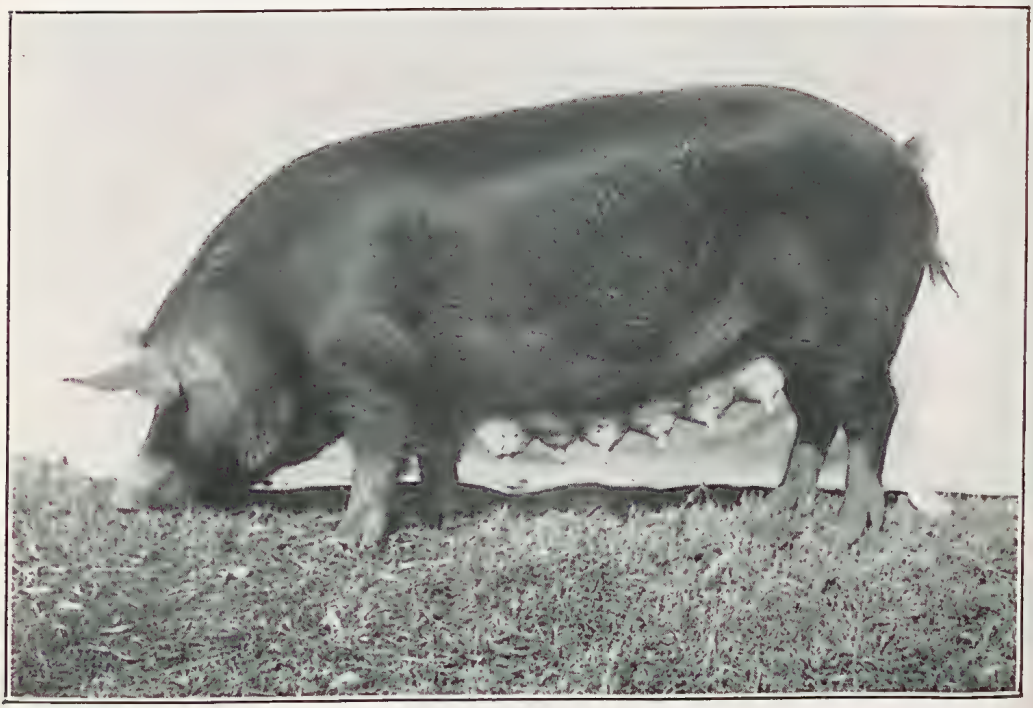

Plate 167.—Mondure Queen, Reserve Champion Tamworth Sow (A. Alford, Traveston), Royal National Show, 1929.

### What the Housewife Wants.

As in Great Britain, so in Australia, the housewife dislikes too much fat in pork, bacon, and ham, because it is wasteful and she cannot find a use for it all. What fat there is must be firm, and never soft or oily. The lean must be well interlaid with fat, and must be moderately hard, yet never tough, while full of flavour.

When she pays for "best streaky" she expects to get it, and therefore her grocer demands good "middles" to be able to supply her.

Queensland housewives like good bacon too and more would be eaten and sales of fresh pork would increase if we could supply the housewife with exactly what she requires at a reasonable price and attractively prepared and placed before her. Just as in England the National Pig Breeders' Association is working along lines suggesting an all-round improvement in matters associated with the pig industry, so in Australia the Australian Stud Pig Breeders' Society, and in Queensland and the other States, the State branches of this organisation are doing likewise. Good work is also being done by the Australian Pig Industry Council, linked up with the State committees and the various Bacon Curers' Associations. With them the Departments of Agriculture and Stock are also working in the hope of paving the way for a more prosperous and lucrative pig industry.

Readers desirous of obtaining copies of the booklets referred to above are advised to communicate with Mr. Alec Hobson, Secretary, National Pig Breeders' Association, 92 Gower street, London, W.C. 1, England.

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## WHEAT PROSPECTS IN THE ROMA DISTRICT.

*The Secretary for Agriculture and Stock (Mr. H. F. Walker) has received the following report from the Director of Agriculture, Mr. H. C. Quodling:—*

An inspection was made in the second week of September of the crops growing at the Roma State Farm, and it was satisfactory to note that excellent progress had been made by the new crossbred wheats, specially bred and selected by the manager, Mr. R. E. Soutter, to meet requirements in Queensland. Although several inches of rain fell in April, less than 70 points had been registered in the last four and a-half months. Notwithstanding this extraordinarily dry period the growth and development of the wheat, oats, and barley in the breeding and propagation plots was good, the better-grown crops invariably being found on the fallowed land, pointing unmistakably to the fact that soil moisture conservation by systematic cultural methods is the principal factor in crop production.

### The Value of Systematic Cultivation.

Elsewhere in the district and in other parts of the wheat-growing belt, a remarkable contrast in the growth and development of crops was observed, due in the generality of cases to a loss of soil moisture by evaporation, principally through late ploughing or failure to maintain a soil mulch on the cultivated lands, such loss being sufficient to account for the change from a payable to a non-payable crop. Obviously, in a season like the present one, those who systematically directed efforts to the early working of their land and to the trapping and storing of moisture will reap the benefit thereof.

### On Roma Downs.

On the invitation of Mr. R. H. McGeoch, a visit was made in company with the manager of the State Farm to Roma Downs Station where Mr. McGeoch has over 200 acres on a deep, sandy loam soil under cultivation with wheat and lucerne, the latter crop being subsequently planted for fattening-off sheep. Several varieties of wheat bred at the State Farm were included in the number being grown under field conditions. The wheats generally were even and well grown, and the manner in which they had developed on such a limited rainfall proved a valuable object-lesson of what can be done by carefully planned farming operations. The crops grown on land broken up about twelve months ago on which the surface had since been kept in a cleanly, well-worked condition, were from 3 feet to 3 feet 6 inches in height and well out in head. In many instances less than half an inch of rain had fallen since planting time, and none of the crops had had more than three-quarters of an inch during the last four and a-half months.

Last year between 300 and 400 tons of wheat were cut for hay and stored in vermin-proof sheds, as a dry time reserve. The quality of the hay was found to be exceptionally good. Although the type of soil being farmed is lighter and of a more sandy nature than that usually chosen for lucerne, this crop is doing well. Only a limited quantity of seed, about 3 lb. per acre, is usually sown, thin planting being observed to permit of more root-feeding space for individual plant development with a view to making the best use of the limited rainfall. Mr. McGeoch is having another 400 or 500 acres cleared to extend his wheat and lucerne cultivation scheme.

### Flag Smut Experiments.

The Flag Smut experiments at the Roma State Farm are showing excellent promise. One well-known fungicide has so far afforded almost complete protection to the plants grown from spore-infected seed. It is expected that valuable data will be forthcoming when the Plant Pathologist concludes this and the other series of Flag Smut experiments at Allora.

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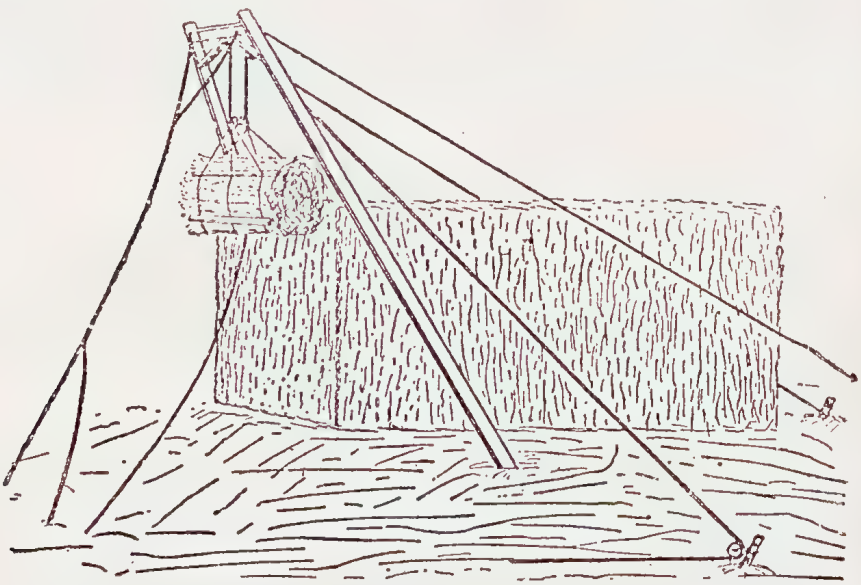
## EASILY BUILT AND OPERATED STACKER.

An inquirer asks us to publish a diagram of a "stacker" which one could use with a hay-fork to transfer hay from the load to the stack conveniently and economically.



The accompanying drawing shows a stacker similar to the one referred to. This stacker is called a two-pole, swinging stacker, and is very convenient in the construction of medium sized stacks. It is a good outfit for the man with not more than 30 or 40 tons of hay to stack. Trunks of trees of sufficient length to allow the bundles to clear the desired height of stack may be used for the poles. These poles should not be less than about 5 inches in diameter at the small end, and the cross-beam and its braces should be about "half-lapped" into the poles and bolted. The poles are raised and guyed so that they have the desired amount of swing, the guy ropes of one side being tight, while those of the other are loose. When a bundle is being taken off the load the poles are leaning toward the load; one end of the draw rope is fastened to the cross-tree at the top, while the other is run through the pulley on the fork or slings, after which it is run through a pulley, at the top of the derrick; then, to the team after passing through an anchored block at the ground. The anchor must be so situated that when the bundle has reached the cross-beam the poles will be pulled back so as to carry the bundle over or past the centre of the stack. The construction and operation of this stacker are simple, and are made clear by the drawing.—The "New Zealand Farmer."

# THE FARM TRACTOR.

## STARTING TROUBLES.

As you know, the tractor starts on motor spirit and is later switched over to kerosene when the engine becomes hot and vaporiser sufficiently heated to vaporise the heavier fuel As the ignition is the most likely cause of trouble, test this first in the following way:—Remove one of the plugs from the cylinder head, attach it to its connecting wire and lay it on the cylinder block so that the skirt of the plug is touching the block, but so that the points and the connection end are not in contact; then turn the engine over by hand and see that the spark is getting to the points. If no spark appears, examine the plug carefully for carbon formation on the electrode, which may be causing a short circuit of the current, prohibiting the spark from jumping the points. Being assured that the plug is all right, examine the connection wire for short circuits, and, having eliminated this, give your attention to the magneto. The most common cause of trouble in this little machine is the contact breaker. If, through wear on the cam, the points are not breaking no spark can be formed. If the points are roughened, burned, or dirty, the result will be the same. If this is so, use a small nail file or magneto file to trim the platinum points. See also that there is no oil on the points. When examining wiring connections from magneto to plugs, look for loose connections, broken wire inside the insulation, or worn insulation, which would result in a short circuit to some portion of the engine against which the wire is lying. If a spark is occurring at the plug points it may be too weak or too small to fire the charge. A bluish-white, fat spark is the most efficient, a dull-red spark being generally ineffective. The correct gap for plug points is 1/32 inch.

### Causes of Weak Compression.

If the ignition is all right, replace the plug and try the motor for compression. If this is weak, it will be due to one of three factors:—

(1) Leaking piston rings;
(2) Badly seated or pitted valves;
(3) Sticking valves.

With (1) and (2) the trouble can only be corrected by dismantling the engine, but with (3) the valves can be freed by removing the valve cover and squirting the sticking stems with a little kerosene until the valve is free and then thoroughly lubricating the stem with cylinder oil.

If the compression is good, the next likely cause of trouble is the fuel system. See that the petrol line from fuel tank to carburettor is free and that petrol is gaining entrance to the float-chamber. Examine the jet to see that this is quite clear and look for water in the float-chamber. Any of these causes would result in the fuel not getting into the combustion chambers of the cylinders.

It is very often the case, particularly with the tractor that is working hard, that the ignition, through general wear and dirt, becomes weak, and, although the tractor gives excellent service while working, it is very difficult to start in cold weather.

If the cause of the weak spark cannot be removed, then it may be necessary to drain the radiator and fill with hot water in order to vaporise the fuel more fully to get the initial explosion.

### A Common Cause of Hard Starting.

The common cause of hard starting with the old Fordson tractor is water in the commutator. This is generally formed as follows:—When the tractor is left to cool off after the day's work the commutator cools off rapidly and the hot air coming from the motor condenses on the inside of the commutator and forms small globules of water. This causes a "short" between the commutator and the roller, with the result that starting is very difficult. With a Fordson that is hard to start, the first thing to do is to remove the commutator, wipe it out thoroughly with a piece of rag, and introduce about a spoonful of light clean lubricating oil.

The factors mentioned above are the main causes of hard starting, and should you be unsuccessful after eliminating all these suggested causes, then it is a job for an expert.

### Engine Missing.

Probably the most common irregularity encountered with the tractor engine is what is commonly termed "missing," meaning the failure of one or more of the cylinders to fire regularly. The result is, of course, loss of power out of all proportion to the percentage of cylinders which are not working.

There are many ways in which missing can be detected, such as irregular sound of exhaust explosions occurring in the silencer, a decided knocking in the motor and excess of motor vibration, and general loss of power and unsatisfactory pulling.

The fuel system may be the cause of missing. If the line to the carburettor is partially choked, sufficient fuel will not be obtaining entrance to the float-chamber in order to supply explosions to each cylinder. Water in the carburettor will have the same effect. If the mixture is too rich or too lean, missing will occur. An over-rich mixture is generally indicated by black smoke issuing from the exhaust. A lean mixture very often results in small explosions occurring in the carburettor and vaporiser.

Poor compression, due to leaky or pitted valves or badly worn pistons and rings, will also cause miss-firing. The sticking of valves, either intake or exhaust, will also cause the engine to miss, or if the valves are not properly adjusted the result will be the same.

In all cases where miss-firing is taking place operations should be stopped immediately, regardless of cost, and the trouble righted. A missing cylinder causes great havoc in a motor, not only from the point of view of the incorrect balance of the engine causing excessive vibration and wear, but owing to crankcase dilution. It must be remembered that the non-exploding cylinder is still drawing into the combustion chamber quantities of gas; the gas is not being exploded and a considerable quantity of it finds it way past the piston rings into the crankcase oil, resulting in excess crankcase dilution.

There is no doubt that the premier tractor fuel to-day, which can be depended on, not only to give greatest power and economy, but also to give those essentials of good idling and easy starting under bad weather conditions with a minimum of crankcase dilution, is the famous new "Cross" kerosene. This new fuel is a departure from any kerosene previously manufactured by the Shell Company and is specially prepared to meet every requirement and every class of work indulged in by the tractor owner to-day.

**Backfiring.**

Sometimes an engine, particularly when it is being started, backfires into the carburettor. A moment's thought on the matter will make you appreciate that for this to occur at least one of the inlet valves must have been open when the actual explosion occurred. Investigation will generally prove that a valve has stuck. On the other hand, the seat of the valve may be so very bad as not to cause any obstruction to the explosion entering the induction system.

An excess of carbon on the piston will also cause a backfire to the carburettor, particularly if the motor has been running for some time, as the carbon deposits become so heated as to burn, thus causing the explosion very often before the intake valve has closed.

Ignition may cause backfiring by a retarded spark or a spark too far advanced, or if the magneto wires are connected to the wrong plugs.

The most common cause of backfiring is a slow-burning fuel mixture, which in turn is most often caused by insufficient heat on the motor.

It should be borne in mind that in order to obtain economy from a tractor fuel it must have weight, and in order to explode the weighty fuel sufficient heat must be on the vaporiser to completely turn it into combustible gas.

If the correct working heat of 200 deg. and 210 deg. is not being obtained, and a blind is not fitted to the radiator, then you should suggest to the tractor owner that he tie a bag across the front of the radiator. Heat on the motor is all-important, and too much stress cannot be laid upon it.

**Overheating.**

While efficient operation can only be obtained from a tractor when it is working at a temperature near boiling point, very often through various causes the motor *over* heats. As you know, the boiling point of water is 212 deg., and if it were possible to work the tractor motor at 210 deg. without overheating, this would be the most satisfactory temperature for it. Nevertheless, overheating sometimes occurs and is damaging to the motor.

The cause may lie either in the ignition or the carburettor or in the motor itself. A late or retarded spark or a very weak spark over a long period will cause overheating. Again, if the carburettor mixture is too rich or too lean overheating will result.

But more often the cause of overheating is to be found in the engine itself, and it is caused by the excess of carbon on the cylinder and piston head. This overheats

the motor because the carbon is a poor conductor of heat and does not permit the heat caused by the explosions to dissipate itself through the cylinder head into the circulating water. A poor quality lubricating oil or an oil too heavy or too light in body will cause overheating; impeded circulation of the radiator tubes; the water pump not working properly, resulting in poor circulation; a slipping fan belt, resulting in insufficient air being drawn past the radiator tubes; bent fan blades; all these causes can be easily corrected.

If overheating is allowed to continue, bad wear results, and many a good engine has been ruined from this cause.

### Smoke.

When black smoke issues from the exhaust it is almost a sure indication that the mixture is too rich, and the smoke you see is actually unburnt fuel. Other causes for the issue of black smoke are poor quality kerosene and insufficient motor temperature, both resulting in poor combustion.

Blue smoke issuing from exhaust is an indication that either too much oil is in the crankcase or that the oil is of poor quality or too light in body. While the crankcase should be kept well up to the full mark with lubricating oil, it is not good policy to put in any excess quantity, as it only results in excess carbon deposits and does not give any better lubrication.

White smoke.—In some tractors small quantities of water are injected with the fuel mixture. The issue of white smoke from the exhaust is an indication that too much water is being taken in. This is a matter of easy adjustment.

### Crankcase Dilution.

It is a common fallacy that crankcase dilution means that unexploded portions or kerosene in liquid form run down past the piston rings into the crankcase oil. It should be borne in mind that crankcase dilution takes place in any motor burning a heavy fuel like kerosene for the following reason:—When the piston goes down to the bottom of its stroke and draws in a cylinderful of gas the gas comes into contact with the cylinder wall, which, in comparison with the vaporiser, is cool. The result is that the gas partially condenses on the cylinder wall and is absorbed by the oil thereon, and from there works down into the crankcase. The presence of the kerosene in the crankcase oil rapidly destroys its lubricating qualities.

The main cause of crankcase dilution is insufficient heat on the motor. The corrective for this has been previously explained.

Other causes of crankcase dilution are, missing cylinders, poor compression, badly worn pistons and rings, sticky valves, &c. More harm is done by crankcase dilution than any other factor of tractor operation.

### Power Loss.

One of the most serious troubles which can be encountered is loss of engine power. There are many factors which can be responsible for this. We itemise them hereunder:—

*Ignition.*—If the spark is retarded and firing too late full power is not developed. It is seldom, however, providing that the spark lever is fully advanced, that a spark will become retarded, unless the engine has been previously overhauled and incorrectly timed.

A weak spark, due to bad ignition, is another factor, resulting in only portion of the charge being exploded, due to the lack of heat of the spark.

*Fuel System.*—A too lean or too rich mixture prohibits the motor from developing full power. There must be enough fuel present in the mixture to utilise all the oxygen in the air which has been mixed with the fuel. With a lean mixture this does not occur. On the other hand, if too much fuel is present for the amount of oxygen, too little pressure is generated in order to develop maximum power. The ideal mixture is one wherein every atom of fuel can be burned.

*Motor.*—Probably the most common cause of power loss is due to carbon. These deposits reduce power in three ways—

(1) By filling part of the combustion chamber, thereby preventing a full charge being drawn in.

(2) They cause pre-ignition by becoming so hot as to ignite the incoming mixture too easily.

(3) They prevent the escape of the heat developed by the explosions, thereby causing overheating, which expands the mixture to such an extent that the explosion is weak.

If the motor is too cold, loss of power results, because the mixture has not been completely vaporised and therefore does not completely fire.

Poor lubricating oil will cause loss of power, because it does not keep the wearing surfaces apart, and permits unnecessary friction. Furthermore, a poor lubricating oil does not seal the spaces between the piston rings and the cylinder walls, thereby allowing the explosive gases to escape on the power stroke, instead of exerting the pressure which means power.

Another common cause of loss of power which is not generally given credit for the trouble, is an impeded exhaust system. If carbon is blocking the exhaust ports or the exhaust pipe considerable back pressure is set up in the combustion chamber, thereby impeding the entrance of the incoming charge of gas.

Other factors, such as bad compression, due to leaky valves and worn piston rings, are, of course, responsible for poor power.

It is interesting to note that the new "Cross" kerosene of the Shell Company is remarkable for its property of complete combustion, wherein an absolute minimum of crankcase dilution is assured. Only in a kerosene specially prepared to meet all conditions of tractor operation is this very desirable feature to be found.

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# Answers to Correspondents.

## PIG RAISING.

*(Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.)*

### Cassava as Pig Food.

F.M. (Mundubbera)—

The tubers of cassava should be boiled before use and the water discarded, this as a precautionary measure, seeing that most farmers are not conversant with the different varieties, non-poisonous or otherwise.

It is as a standby for use in time of drought that cassava appeals most as a pig food, for the plant is very hardy and will live and do reasonably well during periods when other crops will dry off. It would probably pay very much better during reasonably good seasons to depend more upon sweet potatoes than upon cassava. These tubers can be fed without any risk at all, either in the raw or cooked form. We prefer to recommend the growth of sweet potatoes by reason of the fact that farmers are more conversant with methods of cultivation and use, but it must be remembered that the feeding of an excess of sweet potato vines may be productive of harm, while it does not pay at any time to depend entirely upon the one class of food. There are many excellent varieties of sweet potatoes, and for details see our pamphlet on the subject.

*A TRIBUTE.*

*Naturally we are gratified at the results of the 1929 Royal National Show. Record-breaking shows are only gained by reason of the record-breaking co-operation of so many loyal friends.*

*Because of your great co-operation great successes have come our way, and we desire to pay you this tribute and ask you to accept our warmest thanks.*

ERNEST BAYNES, President.
JOHN HIRON, Chairman of Council.
H. W. WATSON, Acting Secretary.

Brisbane, August, 1929.

## MAIZE—THE GROWING CROP.

Important as is the thorough preparation of the soil for maize, it is no more important than thorough after-cultivation. The cultivation of maize should begin almost from the day the crop is planted, and the first operation should be a light harrowing. This harrowing may be left with advantage until four or five days after planting, as it then becomes almost imperative if rain falls soon after sowing, especially on heavy land. In such circumstances, this harrowing will make all the difference between a poor and a good germination; the harrowing kills a heavy crop of weeds, and aerates and warms the soil.

The use of the harrow should be continued until the maize is about 6 inches high. The single-horse cultivator is an implement that is used far too early in the cultivation of the crop by many farmers. Many cannot yet reconcile themselves to the use of the harrow on the growing crop, but the practice is growing rapidly, for it is a case of "once tried, always used." There are, however, two words of caution to be remembered when harrowing growing corn: the first is to select a bright day for the work, as the plants are soft and brittle on a cloudy, cool day, or in the early morning, but quite tough and supple in the heat of the day; the second is to keep the harrow free from clogging rubbish, as this is the cause of many plants being torn out.

The use of the harrow on young maize saves a very large amount of more expensive cultivation and hand-hoeing later on, as it destroys a big crop of young weeds and grass which later becomes troublesome. A light lever harrow is the best type of implement for this purpose.

The next cultivation should be done with a riding instrument which straddles the rows—either a springtooth or rigid-tooth cultivator, or a disc cultivator. The last-named is an implement which has rapidly gained favour in the maize districts on account of the good, clean work done by it. It can be made to throw as much hill to the rows as is desired by altering the set or cut of the discs, and it is a considerable improvement on the objectionable practice of hilling with the plough. The rigid-tooth cultivator is a better implement than the springtooth for tearing out summer grass, couch, or paspalum which threatens to obtain a hold, and which is not so easily dealt with by the disc cultivator.

When the maize becomes too high to "straddle" with a two-horse cultivator, recourse must be had to a single-horse implement, the use of which should be continued for as long as practicable up to the tasselling stage.

The depth of the cultivation should be regulated according to the height of the crop, it being borne in mind that as the crop grows in height its roots more nearly approach the surface. During the early stages of growth, cultivation may be given to a depth of 4 or 5 inches, but later this must be reduced to 2 or 3 inches, or a large number of valuable feeding roots will be destroyed.

For this reason the practice of hilling with the plough is not recommended, as, when the maize is 18 inches or 2 feet high, a large number of roots are cut through by ploughing close to the rows. If hilling is thought necessary at this stage it should be done with a disc cultivator, or with mouldboard sweeps on the single-horse cultivator. It is thought, however, that hilling is a practice for which, in many cases, no good reason can be given. Where young maize "goes over" with the wind, it usually "picks up" again readily of its own accord, and hilling is not necessary for this reason alone. The only justification for hilling with the plough is in a wet season, when a heavy weed growth or grass has obtained a good hold in the rows, and requires early smothering to kill or check it. But this condition can be avoided in most seasons by a thorough preparation of the soil before planting, and by harrowing after planting both before and after the maize is up.

Many farmers practice the removal of suckers from the maize crop with the idea of increasing the yield, and incidentally of providing a little fodder for stock. The experience of the Department has been that the value of suckers is practically offset by the cost of their removal, and that the yield of the crop is much reduced by desuckering.—A. and P. Notes, N.S.W., Department Agriculture.

# General Notes.

## Staff Changes and Appointments.

Mr. F. B. Coleman, Inspector, Pure Seeds Act, Brisbane, has been appointed an Expert for a period of seven weeks as from the 19th August, 1929, during the absence of Mr. F. F. Coleman, Expert and Inspector, Pure Seeds Act.

Police Constable T. A. Brady, of Gympie, Acting Sergeant R. S. Christie, of Coen, and Acting Sergeant J. R. Gannon, of Augathella, have been appointed Inspectors of Slaughter-houses as from the 31st August, 1929.

Mr. Noel Manning, of Kolijo, has been appointed Canegrowers' Representative on the Farleigh Local Sugar Cane Prices Board, vice Mr. Philip Pearce, resigned.

Mr. S. C. Smith, Inspector of Slaughter-houses, Mareeba, has been appointed also Inspector of Stock and Brands as from the 31st August, 1929.

Mr. E. R. Boyd, of Hawthorne, has been appointed a Dairy Inspector, on probation, Department of Agriculture and Stock, Brisbane.

Constable T. Dunlea, of Ravenshoe, has been appointed an Acting Inspector of Stock.

All Dairy Inspectors have been appointed also Inspectors under and for the purposes of "*The Diseases in Stock Act of* 1915."

Mr. S. E. Pegg has been appointed Dairy Inspector, on probation, Department of Agriculture and Stock.

The Officer in Charge of Police at Cambooya has been appointed also an Inspector of Stock.

Mr. G. J. Gray, the General Superintendent of the Mount Isa Mines, Limited, has been appointed an Honorary Ranger under the Animals and Birds Acts, as from the 14th September, 1929.

Mr. T. R. Quinn has resigned his position as Senior Clerk (Accounts) Agricultural Bank, Brisbane, as from the 26th August, 1929.

## A Progressive Queensland Firm for Farmers' Needs.

Customers of the firm of Buzacotts (Queensland) Limited, who regularly call at the company's offices to renew acquaintance with the chiefs of staff will be interested to know that a move has been made back to their own premises in Adelaide street, Petrie Bight, next door to Atherley House and Australian General Electric Company. We are advised that the business is quite settled down in its new premises, and the managing director is confident that the change will mean much better service to customers and anticipates another successful year. The company has on its large staff specially trained experts in pumping and irrigation, dairy requirements, jetting and spraying plants, and orchard pest controls, as well as for Buzacott steel gates and fencing and other rural requisites.

## The Medicinal Value of the Milk Thistle and other Herbs.

Mr. J. A. Hamilton, Carbeen, Cairns, writes:—"I beg to offer you our appreciation of your paragraph in the August "Journal" on the great medicinal value of the milk thistle. It is indeed of inestimable value. I have tested them for many years. We often got sores on our hands pulling corn and they were very difficult to heal, but I found the milk of the thistle would cure them. At the same time, when I got thirsty pulling corn I used to chew the milk thistle leaves and they alleviate thirst and seem to act as a tonic. I am quite sure if the thistle and lettuce, endive, and chicory, which all seem to be more or less of the same family, were more generally used, many ailments would be relieved, including cancer. Mrs. C. L. H. Wallace, editress of the "Herald of Health" (London), was the authority for the statement that a lady who had cancer had been cured by living on lettuce, with hot baths and hygienic treatment advocated in her paper. This was forty years ago. I'd like to bring to your notice a herb book published by Messrs. Heath and Heather, St. Albans, Herts., England. . . . . The weed Cobbler's Peg will cure old running sores and fistula on horses. Ageratum will also cure sores. These are aboriginal remedies. The bark of the Leichhardt tree is a cure for malarial fever. I learnt this from Mr. J. Curr, of the Gulf."

### Travelling Stock Regulation.

Regulation 37 of the Diseases in Stock Act has now been amended in order to give Stock Inspectors power to define the route by which stock shall be travelled.

### Banana Permits.

The Minister for Agriculture and Stock (Mr. H. F. Walker), when interviewed recently relative to the issue of permits to those desiring to grow bananas or increase their areas under this fruit, stated that the present system of dealing with applications for permission to plant banana suckers and the issuing of the necessary permits is being handled in the most efficient manner possible.

The system in force is that as soon as the inspector for the district receives the application for permission to plant he forwards it to the Department of Agriculture and Stock with his endorsement as to the circumstances of the case, and in all cases where the prescribed conditions are complied with a permit is issued and promptly despatched to the grower; or if permission is considered inadvisable the grower is immediately informed of the fact. Mr. Walker added that the conditions appertaining to planting further areas were identical with those recommended by the growers' representatives on the recent deputation.

From the foregoing it will be seen that the banana growers who are in a position to conform with the required conditions are not subjected to any unnecessary delay in the matter of obtaining sanction to plant bananas.

### The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Lecture Theatre of the University on 26th August. Mr. F. Bennett, B.Sc., was in the chair. Mr. H. J. G. Hines, B.Sc., was proposed for ordinary membership.

Mr. C. T. White, F.L.S., read a paper by himself and Mr. Francis entitled "Contribution to the Queensland Flora, No. 4." Two new species—*Labichea Brassii* from North Queensland and *Albizzia xanthoxylon* from the Alberton district—were described as new, and several plants were recorded from Queensland for the first time.

Dr. D. A. Herbert read a paper, entitled "Changes in Osmotic Pressure in Relation to Movement of *Mimosa Pudica.*"

Dr. Herbert exhibited (1) *Empusa muscæ*, a fungus causing fly chlorea, and (2) *Penicillium expansum*, a mould from a decaying custard apple, also found on the apple.

Mr. C. Schindler exhibited a rust fungus, *Phragmidium longissimum*, on *Rubus parvifolius*, from Mount Crosby.

### Restrictions on Banana Planting.

A deputation representative of the banana growers of Diamond Valley, Mooloolah, waited on the Minister for Agriculture and Stock (Mr. H. F. Walker) recently to discuss certain phases of banana planting. The deputation comprised Messrs. J. E. Delaney and C. A. Joseph, and was introduced by Mr. R. J. Warren, M.L.A.

Mr. Delaney said that the growers in the district were being refused permits to plant because of the limited occurrence of disease in their neighbourhood. The position was that two plants affected with Bunchy Top had been found in the locality, and because of this permits were being refused in accordance with the regulation which had recently been issued stipulating that no permits would be granted within a radius of two miles of an affected plantation. He thought that the regulations should be more flexible.

Mr. Joseph supported Mr. Delaney's remarks. He had had considerable experience with Bunchy Top, having grown bananas in the Tweed district for some years, and he would rather be within half a mile of an affected plantation with a high hill between than within ten miles where there was a direct airline.

The Minister, in reply, said that he would constitute an Appeal Board consisting of two representatives of the Department and two growers, who would hear any cases presented to it on their merits. He would also arrange for this to be done in any other district similarly affected. Mr. Walker also announced that he would enforce any recommendations made by the Banana Industry Committee.

### Scrub Turkeys and Cactoblastus.

As an extract from the progress report of the scientific work of the Commonwealth Prickly-pear Board in Australia during June, 1929, indicated that the Scrub Turkey was feeding on the Cactoblastus larvæ, an Order in Council has been issued reducing the period of protection for Brush or Scrub Turkeys on prickly-pear infested land from an annual period of seven months to a period extending from the 1st to the 7th July in each year, inclusive.

### Marketing of Tomatoes.

Following upon the issue of a notice by the Committee of Direction of Fruit Marketing that they intended to issue a "Direction" for the marketing of tomatoes intended for treatment at factories, a petition was received asking that a poll be held to decide whether or not the "Direction" should operate. Regulations have now been issued under the Fruit Marketing Organisation Acts to govern the handling of the necessary ballot.

The "Direction" will apply to tomatoes intended for manufacturing purposes produced in the district bordered on the north by Nambour, on the west by Rosewood, on the south by the New South Wales border, and including the islands in Moreton Bay. It will apply for three months from the 15th September, 1929.

### The State Wheat Board—Mr. J. T. Tod Appointed Chairman.

The Minister for Agriculture, Mr. H. F. Walker, has announced that certain changes have been made in the personnel of the State Wheat Board as from the 31st August. It has been decided by the Government to regard the wish of the Board that an elected representative of the growers shall be appointed as chairman. He has therefore appointed Mr. J. T. Tod, of Goomburra, to that position.

Mr. Tod is an extensive landholder on the Darling Downs, having considerable interests in wheat growing and dairying in the Goomburra and Inglewood districts. He is well and favourably known throughout Queensland as president of the Co-operative Dairy Companies' Association, which position he has held for many years. As well as being a member of the Wheat Board, Mr. Tod is also a director of the Warwick Co-operative Dairying Association and was also a member of the first Council of Agriculture.

The Minister has also appointed the Director of Marketing, Mr. L. R. Macgregor, to the Board.

Mr. Walker also informed the Press that he has been looking into matters pertaining to the wheat industry, and that he felt that there is scope for considerable development in that industry, given the full co-operation of all concerned. He had, therefore, convened a conference which was held in Brisbane on the 4th September, between the Wheat Board, as representing the growers, and representatives of the millers, over which he presided.

### Preference for Queensland Goods Urged.

"I am determined to see that Queensland people get a full recognition of what our secondary industries are doing as far as propaganda can assist, and I want to have them built up," said Hon. H. E. Sizer (Minister for Labour and Industry), when officially opening the John Reid Hall at the recent Brisbane Show.

The hall contained numerous industrial exhibits neatly displayed.

In introducing the Minister and asking him to perform the opening ceremony, Mr. M. P. Campbell (president of the Chamber of Manufactures) said that some people thought that the secondary industries were antagonistic to the primary ones. That was a wrong impression. Their one aim was to do the best for the State.

In opening the hall, Mr. Sizer said that by virtue of the office he held for the time being he was constantly in contact with secondary industries. He was determined to see that the people of Queensland obtained full recognition of what the secondary industries were doing as far as propaganda could assist, and he intended to have them built up as far as he was able. It was essential for the Empire's progress that the secondary industries should be fostered.

There was great scope for education to develop manufacturing industries in Queensland, and if the people would stand behind the manufacturers and the State, and purchase home-made goods, then the industries would grow, and unemployment would disappear quicker than otherwise or by a wholesale loan policy.

### New Bird Sanctuaries Proclaimed.

An Order in Council has been issued declaring Connolly Dam, Silverwood (Warwick), Rifle Creek Dam (Mount Isa), and portion of Harrow Station (Cambooya) to be sanctuaries for animals and birds from which places it will be unlawful for any person to take or kill any animal or bird.

### Pure Water for Dairy Cows.

"What is the cheapest and best form of food for dairy cows?" "Pure water," the owner of a cow which last year produced 10,584 lb. milk and 542.6 lb. of butterfat, is stated to have replied, adding: "Only be sure that the water is put in the cow and not in the milk can."

Milk is approximately 87 per cent. water, and if the cow does not have access to an unlimited supply of fresh, clean, palatable water her milk flow is bound to suffer heavily. A high-producing cow will consume from 25 to 30 gallons of water per day. A reliable automatic water supply system has proved to be one of the most valuable items of a dairy farm's equipment.

### Food and Emotions.

"There are three ways of regarding the body. The first is as an enemy, an evil to be fought and ill-treated; the second as the spoiled child, pampered and put first, and protected; and third, as a good servant and friend, that is the winning, harmonious co-operator with mind and spirit. The third way is the correct way in which to regard the body. The whole personality should be considered. Looking to the harmonious working of the body did not mean fussiness. Wholesome food eaten in a happy, controlled spirit may do more good than a faultless diet combined with worry. All negative emotions such as anxiety, fear, resentment, and anger have ill-effects on the body. Confidence, trust, and love, and other positive emotions liberate the physical powers."—Dr. Evelyn Saywell, in an address to a health conference.

### SEED MAIZE.

UNPRECEDENTED DEMAND FOR DEPARTMENTAL STOCKS.

*The demand for seed maize this season was unprecedented, and although large stocks of several varieties were held these were quickly exhausted.*

*The response to the advertisement of seed for sale in this Journal was extraordinary. The rush of early orders soon covered the whole of the supply available, and a very large number received later and which could not possibly be filled had to be returned with regret.*

*Each season sufficient seed to sow some thousands of acres is raised by the Department, and the demand is ever increasing. This is proof of the reputation won for the improved strains and grades of grain bred by the Department; and it also shows that farmers are realising the value of planting seed of tested varieties.*

*All the varieties that were advertised in this Journal have been grown by the Department for many years, and the valuable work of improving type and yielding capacity is carried on from season to season.*

*The Department is continually introducing new varieties, which are tried out in the several maize-growing districts, and any that prove good yielders and of a suitable type are retained. Included among them is Funk's Ninety Day, which is so popular with Queensland maize growers.*

*Plans are now well forward for meeting every possible future demand for selected seed of all improved varieties tested under ordinary field conditions, and thus avoiding the risk of disappointment to growers who desire to obtain the best seed from the Departmental plots.*

### The Way of the Reformer.

"It is quite proper to accept a compromise as an instalment. If we cannot get the whole, it may be quite right to accept the half. We may live to secure the other half another time. We must, however, see what the acceptance of the half involves. It may be that if we accept it we shall be hindering instead of advancing a genuine reform. We may be sidetracked. John Morley put this with great force when he said, commenting on the French saying that small reforms are the worst enemies of great reforms:—'There is a sense in which the saying is profoundly true. A small and temporary improvement may really be the worst enemy of a great and permanent improvement, unless the first is made on the lines and in the direction of the second. . . . The second possible evil of a small reform may be equally mischievous—where the small reform is represented as settling the question. . . . It sets men's minds in a posture of contentment which is not justified by the amount of what has been done, and which makes it all the harder to arouse to new effort when the inevitable time arrives.'"—James Scott, in "Chambers' Journal."

### Shearing of Lambs.

Generally speaking, lambs intended for sale direct from their mothers should not be shorn. The value of the wool will not recompense the reduction in the quality of the flesh due to the handling and bruising, nor does a shorn lamb look attractive, rarely realising a good price in the market. The principal item in fat lambs, of course, is the flesh, but the pelt has a certain value, which is practically nil if the lamb has been shorn.

In a season like the present, however, observes the Sheep and Wool Expert of the Department of Agriculture, the question of shearing is one to be considered, as unless seasonal conditions change for the better it seems problematical whether the lambs can be brought to a marketable condition by weaning time, and so long as there is no danger of loss due to cold they may respond more quickly if shorn than if left right through the season in the wool.

With regard to Merino lambs, in ordinary seasons, weaning and shearing are often carried out at the same time, but when, as at present, the lambs are not in very good condition and no good feed is available for weaning them on, the two operations (weaning and shearing) at once may be too great a strain on the lamb's constitution, and it may therefore be advisable either to leave the weaning until a later date or put off the date of shearing.

### Uses of Lemon.

Many people prefer lemon juice to vinegar when mixing a salad dressing, and it is much more digestible.

For washing dainty handkerchiefs add a few lemon rinds to the water when it is cold, and boil it with the handkerchiefs, and you will be surprised at their snowy whiteness.

As everyone knows, lemon juice is very useful after an accident with the inkpot. Rub lemon juice on the mark at once, leave for five or ten minutes, then wash off with milk, and the stain will have disappeared.

The juice of a small lemon, or half of a large one, taken first thing in the morning, without adding either sugar or water, is wonderfully helpful for rheumatism and indigestion.

The same treatment will soon make the muddiest complexion clear. After the lemon has been squeezed out, save the skin and rub it over the fingers if you want to remove ink or other stains from the hands. A few drops of lemon juice added to a little glycerine will make the hands soft and white again after a day's work in the garden.

In cookery the lemon is invaluable. Many sauces are insipid unless a squeeze of lemon juice is added. Sauces and custards are all the nicer if the thinly-grated rind of the lemon is boiled in the milk or cream preparation and then strained out. In stuffings a little finely-grated lemon rind adds piquancy and flavour. Many people prefer a slice of lemon in their tea to sugar and milk. Cakes for tea and some light puddings are nice with the finely-grated lemon rind added. Lemons, too, are invaluable for garnishing, their yellow tint adding colour to insipid food. Cutlets, fillets of fried fish, and pancakes all look and taste better if garnished with slices of lemon.

## The Care of Hides and Skins.

Careless methods of flaying the skins of cattle and sheep, and excessive branding of cattle and calves, are the causes of heavy losses annually—the present methods of branding are computed to be responsible for damage to Australian hides amounting to a yearly loss of half a million sterling. Inefficient curing and the dirty and stained condition in which hides and skins are often marketed are other causes of depreciation, while the cuts and score-marks received by the living animal through horning, contact with barbed wire, and other external injuries, also combine to discount values.

The practices responsible for bad hides, and the correct methods of slaughtering and skinning, curing, and marketing, are discussed in detail in a pamphlet recently issued by the Department of Agriculture. It is pointed out that farmers, station-owners, and country butchers supply a fair proportion of the hides and skins reaching the city skin stores. Country hides are for the most part ripped off carelessly, without regard to final shapeliness, and very often very little attempt is made to cure them or preserve them in any way. As they are generally marketed indirectly, they frequently reach the tanner in a condition known as "slippy," and are more or less putrid, and very little good leather can be manufactured from them.

If consignors improved their methods of branding, flaying, and curing their hides, the reader is reminded, city buyers would quickly recognise the fact and pay accordingly. By disposal on the farm to country dealers the hides eventually lose their identity, and the careful man is not compensated to the full extent for the care he may have exercised. Hides and skins may be forwarded in large or small parcels to the various stores and sold on account of consignors. Clean, well-cured, good-shaped hides, free from scores, cuts, blemishes, and slip, will fetch top values.

## The Principles of Sheep Feeding.

The principles affecting the feeding of sheep are studied even less than those affecting the feeding of other animals, observes the Chief Veterinary Surgeon of the New South Wales Department of Agriculture, but their consideration is periodically a matter of very great importance. The writer draws attention to some facts of which pastoralists might well be reminded just now.

The tendency is to regard the fact that sheep have lived for some considerable time on scrub or very dry innutritious food as evidence that the food is sufficient for them, but as a matter of fact a continuous lowering in tone is taking place, varying in degree according to the quantity and quality of the food. This lowering in tone may be so slight that no ill-effects are observed, and when good feed comes again the sheep recover their tone; on the other hand, it may be so marked that the digestive system becomes unable to deal with the food, impaction results, and heavy mortality may follow. This is particularly liable to occur in pregnant ewes towards lambing time, and in sheep that are travelled or put to some other strain. In between these manifestations are all gradations of the trouble, and in many cases only small numbers of the weaker sheep die.

What the animals suffer from is actually slow starvation. The impaction is certainly increased by the astringent nature of so many scrub fodders. It is impossible to lay down any hard-and-fast rules as to when and under what particular conditions mortality will occur, but it is obvious that the longer the period of innutritious feeding the more likely it is to have unfavourable results. Experience with the particular fodders used and the conditions existent on each holding must serve as the owner's guide.

It is plain that prevention of such mortality depends on the supply of food which will counterbalance both the lack of nutritive quality and the astringent nature of the scrubs and rough, dry fodders. Although, to prevent all ill-effects, this must be undertaken throughout the period of dry feeding, it is remarkable how rapidly sheep will recover from very severe loss of tone and impaction—even after deaths have occurred in the flock from these causes—if food is changed. Losses of lambs through deficiency of milk in the ewes (an indirect effect of the trouble discussed) may also be guarded against at the same time by use of the same measures.

But not only does loss occur from continued dry feeding—yet further loss is involved in the sudden change to extremely succulent food. Surprise is often expressed that mortality in sheep is so heavy after the appearance of what is referred to as good food, but, as a matter of fact, such rapid-growing, succulent food as appears after copious rains following drought possesses very little body, and in the already weakened condition of the animal will not sustain life, particularly as at such times the animal requires the production of a good deal of body heat. The question then arises of the possibility of supplying some dry roughage in addition to the green food.

**Poisoning of Sheep by Chemical Fertilisers.**

An inquirer asks whether sheep are likely to suffer ill-effects from the residue of artificial fertilisers used in the topdressing of pastures.

The ingestion of basic slag has been alleged to have caused the deaths of sheep grazing on land which had been recently dressed with this fertiliser.

Heavy applications, followed by a period of dry weather, when the slag is inclined to lie on the ground or cling in an undissolved state to the roots and stalks, may lead to animals consuming it in quantities sufficient to cause fatal results.

Reputed cases of poisoning have occurred twelve days after sheep had been depastured on to paddocks dressed with slag in the proportion of 2½ cwt. per acre, and in the complete absence of rain. Certain of the animals became ill, were unable to stand, and had to be destroyed.

In experimental cases, the lesions due to basic slag poisoning are those of inflammation of the lining membrane of the stomach and small intestines. The urine may have an opaque creamy appearance.

Experiments carried out in Vienna in 1919 proved that fertilisers such as basic slag, superphosphate, kainit, sulphate of ammonia, nitrate of potash, and nitrate of soda are capable of killing sheep receiving small quantities mixed in the feed.

Under ordinary circumstances, it is rare that sheep are able to pick up from the pasture sufficient of the material to cause death, or even derangement of health.

The possibility of this contingency should, however, be remembered when chemical fertilisers are being used. It is prudent not to depasture sheep on to freshly treated paddocks until the fertiliser has been to some extent dissolved and washed into the ground by rain.—The "New Zealand Farmer."

**Bloat in Cattle—Causes and Treatment.**

Bloat, or hoven, is due to succulent foods eaten under certain conditions which cause the formation of large quantities of gas in the rumen or paunch, and, in consequence, a swelling of the left flank. It is most often seen in the following circumstances:—

(1) When cattle are turned hungry on to such succulent green food as lucerne or clover.

(2) When cattle used to dry feed are suddenly changed on to green, soft food.

(3) When travelling cattle are allowed access to large amounts of green food, such as variegated thistle.

(4) When cattle gorge themselves on wet grasses or herbage.

(5) When cattle are fed on roots or potatoes under certain conditions.

Some animals appear to be more subject to hoven than others.

Keeping the mouth open with a gag, or a piece of wood, until the beast has belched most of the gas out through the mouth will be useful in mild cases. The internal administration of 1 oz. of bicarbonate of soda and 1 oz. of ginger is sometimes useful, and it may be repeated in a few hours—if necessary.

In a bad case the most effective treatment is the puncture of the paunch. This is done on the left side in the flank—at a point equidistant from the last rib, the edge of the loin bones, and the angle of the haunch. The correct instrument for this purpose is trocar and cannula. The cannula is a tube through which passes a sharp pointed instrument—the trocar. This instrument is thrust into the rumen, and the trocar is withdrawn, leaving the cannula in place, and through this the gas escapes. In case of emergency a knife may be used in the same way, the gas escaping through the cut, but complications may set in and cause death if this is not done expertly. After the gas has escaped the animal might be given a dose of linseed oil (1½ pints) and turpentine (1 tablespoonful). This mixture should be well shaken up while being given.

Every effort should be made to prevent the occurrence of hoven in stock. In feeding lucerne and clover, if the animals are not used to it they should be put on it gradually until they become accustomed to it. If lucerne is fed in a wet state, or after heavy rain—when it is soft and juicy—it will almost always produce trouble; and cattle should, therefore, be kept off it until it is drier.

### Whitewash on the Farm—The Spring Cleaning.

Whitewash has a wide application to farm use and deserves a much greater popularity than it at present enjoys. Its ingredients are inexpensive and readily obtained; it is not difficult to make, and it is easy to apply. In addition to these advantages, it protects the surfaces to which it is applied, brightens up dark interiors, and is sanitary. Whitewash may be coloured provided that light tints and shades are used, and that the pigments are not affected by lime. Among such are yellow ochre, raw and burnt umber, and raw and burnt sienna. The surface to be whitewashed should be just as clean as one that is to be painted, and it is a first essential to good results that all dirt, dust, grease, and scaly material be removed before there is any attempt to apply the wash. This implies a liberal use of scrapers and stiff brushes. When the cleaning is finished and the surface dusted, it is well to dampen it slightly just before applying the wash.

### Action of Frost on Soil.

It is known that frost is one of the principal agents in the disintegration of rock and in its transformation and final conversion into soil. This action continues to be exercised on the soil, increasing the proportion of fine particles, but with extreme slowness. On the other hand, frost has an immediate effect on soil colloids—e.g., it breaks up compact clayey soils into separate lumps. According to Ehrenberg this effect is not due solely to the expansion to the interstitial water, but also to the growth of ice crystals. The resulting lumpy texture increases the permeability and aeration of the soil, which tends to dry it and facilitate its cultivation without risk of its again uniting into a solid mass. The solidification is apt to be renewed, however, as a result of heavy spring rains, also in many vegetable soils. Attempts have often been made to attribute the beneficial effect of frost to the fact that it renders soluble the nutritive elements in the soil, but this could not be conclusively proved experimentally. On the other hand, it has been shown that the total surface of the particles of a granite soil has increased 6.13 per cent. after exposure to frost. This effect is directly beneficial to plant growth, which shows that the old saying, "If the ground does not freeze the crop will be thin," has not lost its meaning in countries with a cold winter.

### Bee Culture.

Whether it is intended to go in for bee-keeping commercially or merely as a hobby, spring or early summer is the most suitable time to make a start. In either case, too, but especially in the case of the person who hopes eventually to depend upon bee-keeping for a livelihood, the enterprise must be given proper thought.

Success or failure is often determined by the method of making a beginning, and it is well to avoid if possible the purchase of bees in old boxes, and the consequent necessity for transferring, which process is itself sufficient to damp the ardour of one who is unacquainted with the work. There is also the risk of introducing disease. The better way is to purchase a hive (or hives) outright. The purchase should be made from a reputable breeder; otherwise the hive should be examined by an expert previous to purchase to certify its freedom from disease. Another method of establishing an apiary is to prepare hives (factory-made for preference) by nailing, painting, and fitting with comb-foundation, and then to purchase prime swarms from a neighbouring bee-keeper when swarming is prevalent.

The land for an apiary should be fairly level, well-drained, and for preference the hives should face the north-east. A trellis of passion vines around the plot makes an ideal windbreak, and affords protection to the hives both in summer and winter. The equipment required for the running of a small apiary is neither extensive or costly. The requisites are mostly standardised throughout Australia, which is an advantage. The Langstroth ten-frame hive may be purchased in lots of five with supers at a reduction in price. A smoker, hive tool, veil, uncapping knife, and honey extractor are among the other requisites.

Bees play a very important part in the pollination of fruit trees, and the establishment of an apiary might well be considered by every orchardist. One to three colonies per acre of orchard should show a material increase in quantity and quality of fruit, while sufficient honey and beeswax will at ordinary times be produced to enable a surplus to be marketed. The site of the apiary need not be in the orchard. A small allotment of ground should be selected where the bees are not likely to be disturbed when cultivating.

### The Waler still Wanted—Australian Horses for India.

General W. H. Anderson, Director-General of Remounts for the Indian Army, is at present visiting Australia in connection with the supply of horses for the Indian Army.

The impression, he says, that horses from Australia are no longer required, owing to the mechanisation of the army and the fact that India is breeding her own horses, is quite erroneous.

India requires about 3,000 horses every year for the army, while the native States require another 1,500. In addition, there is a large private demand for polo ponies and horses for sporting and utility purposes.

Australian stations, General Anderson considers, must continue to breed horses for home use, and the surplus can be exported to India. The quality of the remounts needs, however, to be improved, as there has been a serious decline in the standard in recent years.

### An Argument for "Safeguarding."

"Last year a friend of mine sold 5,000 tons of rags. He told me that these rags would be made into cloth by skilled men in Poland who were receiving from 13s. to 15s. a week. If any hon. members opposite were in business, could they say how they would compete with that country if they were having to pay £3 per week to men doing the same kind of work? A man in my division who has a woollen mill comes to London and buys certain materials. The man in France also comes to London for the same purpose. The freight charges from London to Roubaix are more than they are from London to the West Riding of Yorkshire. In Roubaix they have their mills well equipped; rebuilt out of reparations since the war. The mills are well fitted up and they employ workmen who are probably as skilled as the workmen in Yorkshire. That is the reason why we cannot compete with them. Simply because in Roubaix the worker in the woollen mills receives a standard rate of £1 2s. 11d. per week, while for the same work in the Dewsbury and Batley area in the West Riding of Yorkshire the standard wage is £2 14s. 10d. Can the House say this is a fair and reasonable competition?"—Mr. C. V. Gibson, M.P., in the House of Commons.

### Silage for Sheep—Some Feeding Points.

Although silage is one of the best substitutes for green grass and a reserve of it is of great value in a season such as the present, a certain amount of disappointment is sometimes expressed by those who are feeding it for the first time. Writing to the Department of Agriculture recently, a sheep-owner stated that he had been feeding silage with lucerne hay, but that the sheep showed a marked discrimination in favour of the lucerne, and if they picked up a bit of silage immediately dropped it again. He had been feeding it for four or five days.

Such an experience is by no means unusual, stock apparently having to acquire a taste for silage. To begin with, only a small quantity should be fed to sheep in a small paddock, and it is best to feed it out in the evening, for if large quantities are put out in the morning and the sheep do not at once take to it, it will dry out in the hot sun in a few hours and be wasted. Once the sheep become accustomed to silage they greatly relish it and will follow the wagons when the silage is being carted out.

Although sheep are often satisfactorily fed on silage alone, continued feeding on silage exclusively results in loss of condition, the feed being lacking in protein. It is therefore preferable to feed silage in combination with a small quantity of wheaten, oaten, or lucerne hay—especially the last mentioned, because of its high protein content.

Feeding should be commenced while the sheep are still in good, strong condition, and while there is some rough grass about. The silage need only be thrown over a clean piece of ground, but it should be well spread out, and it is best to get a good deal out every day before the sheep are allowed to feed. The sheep should be drafted into lots according to their strength.

A plentiful supply of salt should be provided for sheep when feeding on silage, even in districts, such as salt-bush country, where it is not ordinarily used to any extent. The lick is improved by adding about 6 oz. of Epsom salts to about 100 lb. of coarse salt.

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.*

### THE MENACE OF BAD TEETH.

The enamel which caps our teeth is the only surface tissue which is never renewed. Once injured, it can never be repaired. A crack or hole in the enamel is an open gateway for bacteria, which enter and destroy the teeth. The tooth decays, and becomes offensive; decayed teeth cause inflammation, abscesses, and open sores, which do not heal over until the teeth fall out, or have been extracted. We might imagine that nature had been careless, in leaving this part of our bodies vulnerable and defenceless. But our teeth are formed on the same plan as those of other animals, whose teeth continue good throughout their lives. Prehistoric man had excellent teeth from infancy to old age, and many primitive races have the same to-day. Bad teeth, on the other hand, are becoming almost universal in modern civilised man, and in all primitive races as soon as they adopt civilised customs in food. We may say that they are the result of civilisation, or more correctly, of some defects of our civilisation which need amendment.

Modern medicine is becoming more and more impressed with the dangers of bad teeth. The miseries of toothache are well known, and the abscesses of the jaw that may be caused by decayed teeth are serious troubles. But far more serious is the poisoning of the system by the constant swallowing of the agents and products of dental decay, to which may be attributed many cases of dyspepsia, gastric, and duodenal ulcers, and appendicitis. Septic teeth may be the original cause of septic tonsils which need surgical removal. Recently that fatal disease, pernicious anaemia, has been traced, if not with certainty, at least with much probability, to the same cause. With still more confidence do we point to dental abscesses as frequently the root cause of crippling rheumatism. Medical men are becoming more and more inclined to attribute some obscure heart troubles, nervous troubles, and other mysterious conditions to the same source. Even cancers of the mouth appear to be more frequently in dirty than in clean mouths. Gradually, we have come to recognise bad teeth as one of the chief causes of disease.

Causes which act slowly, and at a long interval of time, are apt to pass unrecognised. Careless neglect of the teeth of a child may, and often does, lead to the death of a man or woman in the prime of life, or to such crippling as leads to chronic invalidism. Now that we are coming to recognise the cause of these disasters, after the mischief is done, surely we shall endeavour to save our children from such a fate by removing the cause. Certainly, owing to the occurrence of toothache, which is one of the greatest blessings ever bestowed upon mankind, we have learnt to some extent, with the help of the dental profession, to care for our teeth. But it would be better still to preserve our children's teeth by natural methods, as they were preserved in primitive man and the lower animals.

#### To Grow Good Teeth Right Foods are Necessary.

Weakly developed teeth do not necessarily decay. This is a fact established by dental observation. Nor do strongly developed teeth necessarily escape destruction. This also is well established. But other factors being equal, teeth of weak construction are more easily destroyed. For the growth of strong teeth, two things are necessary. The first requirement is a sufficient supply of food containing the necessary vitamins. The most important vitamin-containing foods are uncooked vegetables, fresh fruit, fresh milk, eggs, and butter.

These foods are necessary for the child-bearing mother that her baby may have good teeth. They are necessary also for the child after his first year in order that his permanent teeth may be strongly developed. For the first year of life—the most important period for the development of the permanent teeth—nothing is so good as the mother's milk.

**Nipped in the Bud.**

The second requirement is sufficient space in the jaws for the developing tooth germs, the avoidance of undue pressure and overcrowding. It is for this reason that the preservation of the temporary teeth of children is so important. If a temporary tooth is allowed to decay early and become lost, the adjacent temporary teeth tend to fall together. The developing permanent teeth beneath them have then insufficient room for strong development. They may emerge out of place and overlap, so as to be useless for mastication. Another frequent cause of malformation is poor and restricted development of the jaw bones, with crowding of the developing teeth. It is often forgotten that bone is a living tissue, constantly altering its form, as it reacts to strains and stresses, and that this is more especially true in the growing child. Most serious deformities of the teeth may result from nasal obstruction, accompanied by narrowing of the jaws, and high arched palate-bones, or from the constant pressure caused by habitual sucking of the thumb, or fingers, or dummy. Still more common is the arrest of development, owing to want of use, more especially the want of hard biting. Most unfortunately, most of the foods we give our children are too soft, and those that are not soft, such as crusts of bread and meat, are tough and not hard. Tough foods have to be chewed; hard foods have to be crushed, and it is the powerful crushing muscles that exert the greatest force in widening the growing jaws. The baby should be given hard, crisp, baked bread, which may or may not be toasted (bread toasted without being baked is only hard on the surface) instead of soft bread and butter, hard baked oatcakes sometimes instead of soft porridge. Breakfast foods are valuable in porportion to their hardness and crispness, and porridge may be improved by the addition of a large spoonful of prepared bran. Of course the baby must be taught by degrees how to bite his food. As soon as he is old enough he may be encouraged to nibble a piece of raw apple at the end of his meals. In narrow, poorly developed jaws the developing germs of the permanent teeth, which lie closely packed between the roots of the temporary teeth, have not sufficient room for healthy growth. Literally, not metaphorically, they are nipped in the bud. They emerge weak and are easily destroyed. And so, from want of hard biting, we grow teeth that will not bite. For older children cracking nuts and crushing their kernels (within reason and moderation) is a valuable exercise for the jaws, and so is the biting of sugar-cane. Indeed, for dental purposes sugar-cane may be regarded as a fruit, the sweet acid juice being beneficial and the exertion needed for its extraction entirely wholesome. Perhaps in some future generation (most of the present generation are, alas, incapable of such feats) our school children will enjoy ten minutes interval every morning for nut-cracking and cane-biting, and every child who cannot crack his nuts, or crush his sugar-cane, will be referred to the school dentist for treatment.

Let us grow as strong teeth as we can, but whether strong or weak, let us preserve the teeth we have.

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## BOUGAINVILLEA.

Anyone visiting the beautiful garden of Mr. Thomas, at Indooroopilly, again this year, will be impressed with the many possibilities of design and effect that can be made with this very hardy and showy climber. The appreciation of the bougainvillea is shown by the hundreds of persons who go to see it in bloom. It is a hardy plant, and loves sunshine, and there is no reason why it should not be more widely grown. A little time and patience will amply repay anyone who contemplates its culture. Cuttings strike readily as soon as the blooming period is over. They should be about 12 in. long. Select last season's growth, and plant in sandy soil in a shady place.

Put the cuttings about 6 in. deep in the soil, and press down firmly. Keep the ground moist, not soaking wet. If you require a more immediate result, obtain plants from the florists in pots. There are about seven different colours to select from. When the plants have grown to a height of 2 ft. then select your design and prune accordingly. To train the plant make a skeleton design of wire, and then trim the plant by removing all shoots that may be growing in a direction that is not required. About May or June pruning must be stopped, as all the new shoots then appearing will be flowering shoots. As soon as the blooming period is over commence pruning again to still improve your design.

There are many methods of growing bougainvillea, and one that finds favour with many is that of planting it around an old tree that is not wanted, and ringbarking the tree when the bougainvillea is firmly established. It will then hang down from the branches of the tree and form a beautiful garland of bloom. It is an evergreen and never appears unsightly.

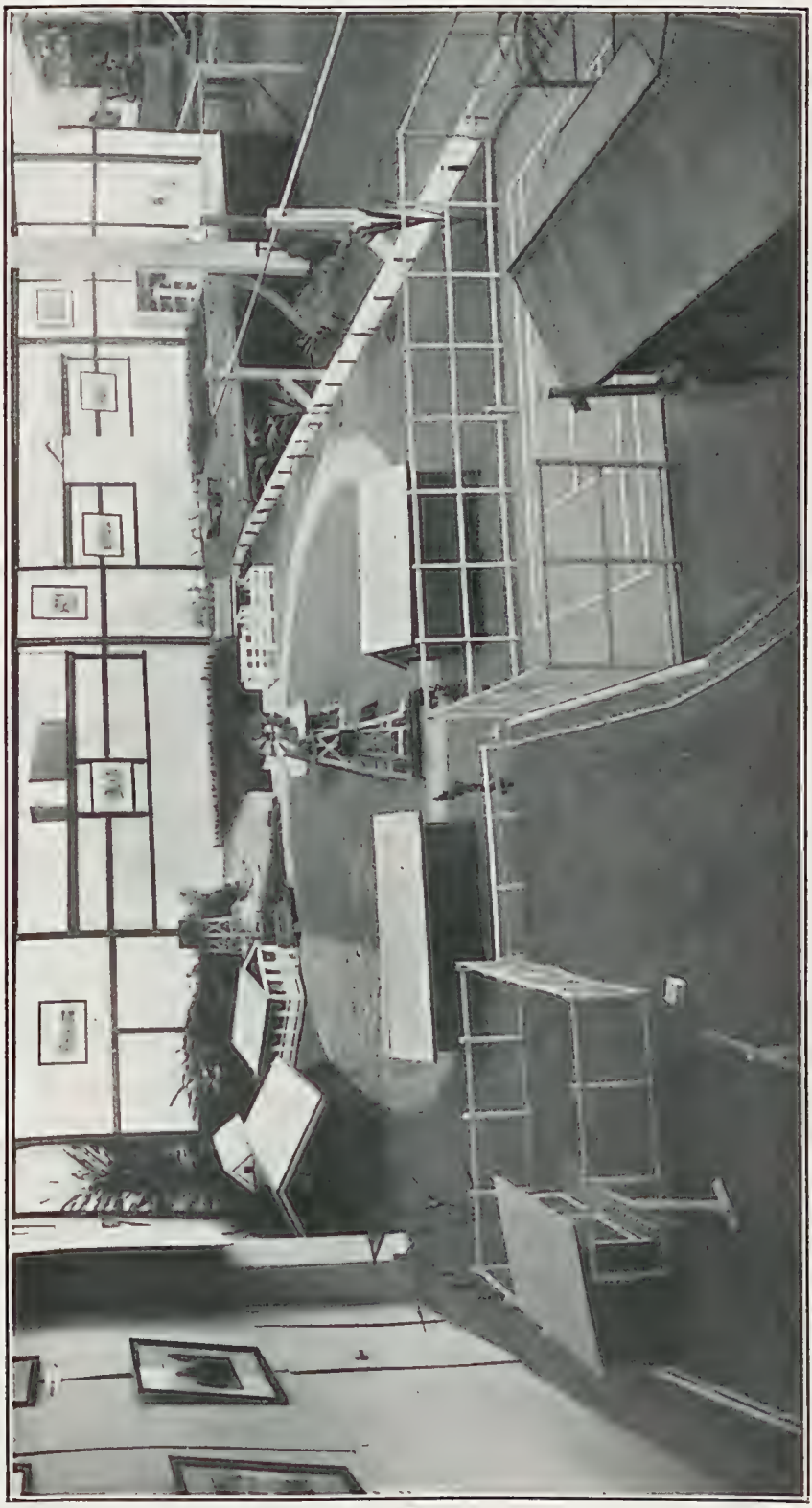

PLATE 168.—A LAY-OUT OF A MODERN FARMYARD—A MODEL HOMESTEAD IN THE RURAL SCHOOLS' DISPLAY. ROYAL NATIONAL SHOW, 1929.

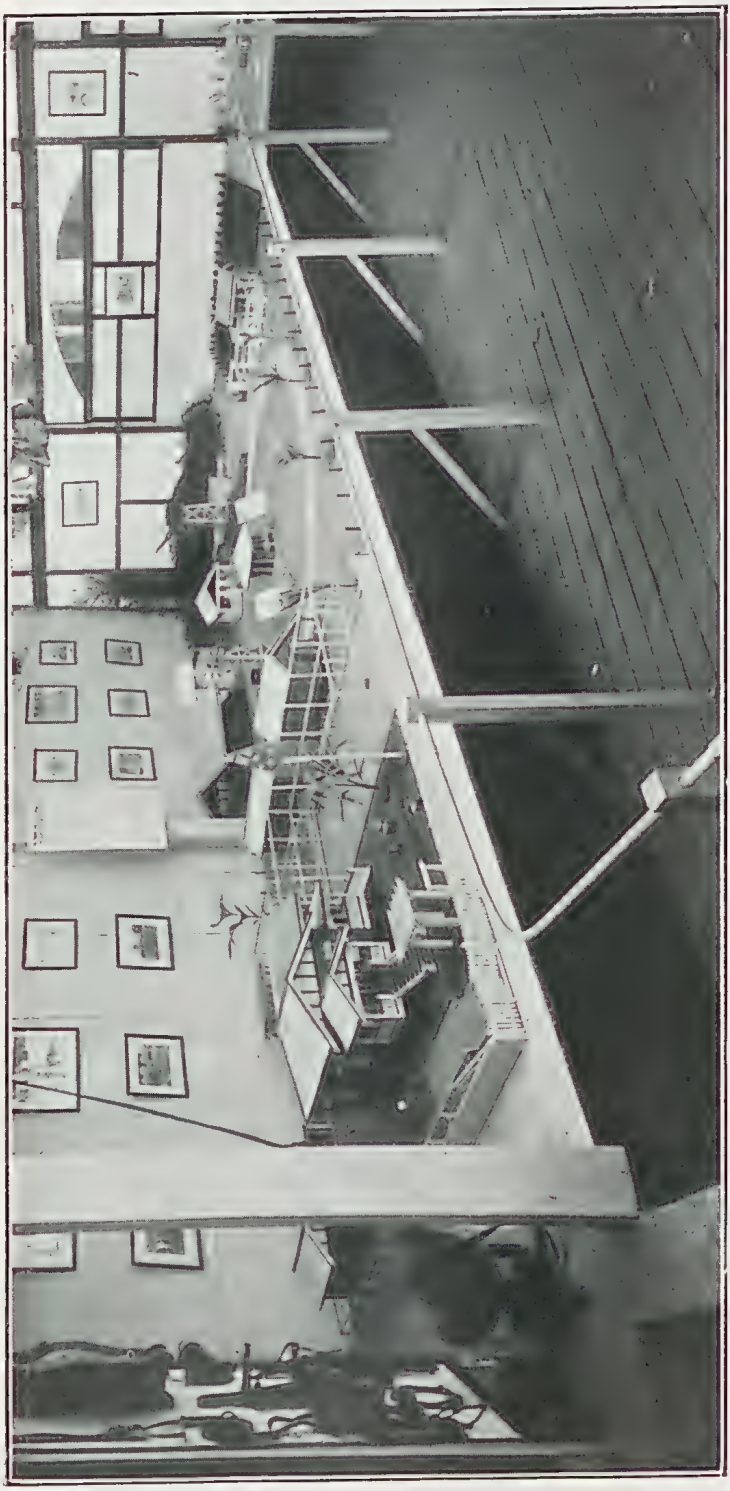

Plate 169.—Another view of a Model Farm Homestead in the Rural Schools' Display. Royal National Show, 1929.

## PEOPLE AND GARDENS.

*"It depends on the mood of the man, whether he shall see the sunset or the fine poem."*

In the garden among the flowers, I have learned the value of work, for it is only by working, planning, and planting, "sowin' things, an' growin' things, an' watching of 'em grow" . . . . that we obtain any results in the garden or learn anything about the flower world, and how to get them to grow.

We prepare the soil, sow the seeds, water them, and in due time are rewarded by little soft, green shoots thrusting their way through the earth, and then there is the joy and wonder in the final and lovely harvest of glorious leaf, bud, and blossom.

I have learned the value of prayer in my garden, the value of good, strong thoughts that working in a garden and among flowers must necessarily bring. Every green thing that grows in the flower-patch was a prayer when I planted it, as I looked forward to its lovely future, picturing it in its gay beauty, and in the bud, blossom, and fruit of it, I see the realisation of my prayer.

The beauty of nature, and the significance of it touches different people in different ways. Some understand it, and because of this understanding, they find in it a great love and joy, pleasure and profit. Others remain perfectly or imperfectly oblivious to it, and are quite unconscious of the fact that they are missing anything, accepting the sunshine, the air, the sky, fruit, and flower as a matter of course, and just as a very ordinary fact of creation.

Nature acts differently on many of us, making great writers of some, great poets and artists of others; and then there are others who are content and happy to make a garden, and fill with flowers. But it makes good and strong men and women of all of us, if we allow it to enter and ennoble our daily life and existence . . . but how many of us do not?

Some people understand and comprehend nature in an indefinable and aching longing to possess a garden filled with flowers, others are content to admire the flowers, pick them and decorate their house with them, while there are others who even find a joy in flowers from a florist's shop . . . . and then there are some who have not the money to buy them, and yet find a certain longing fulfilled in gazing at the flowers for sale in the window of a flower shop, or even by gazing at lovely gardens on the way. Some people who have no garden space, try to grow flowers in pots or on window ledges, but wheresoever we may go, we will see the urge of nature expressing itself in different ways.

The actual possession of a garden gives one more joy than we realise, until we have become the owner of one and worked and walked in it. It raises us to higher things, cultivating habits of observation, and not only habits, but powers of observation too, for it is only when we have worked among the flowers, planted them and grown them in the sweet-smelling earth, that they begin to whisper their secrets, and we hear the "still small voices" of nature whispering on the breeze. It gives us a healthy interest, a love of the beautiful, and the power to appreciate the great growing world outside, and teaches us to realise and grasp the joy that life can give.—Enid, in "The South African Gardening and Country Life."

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## CONTROL OF WEEDS ON LAWNS.

Weeds in lawns and on bowling and golf greens cause considerable annoyance and trouble, and are often difficult to control, especially if proper precautions have not been taken from the outset. As a rule, most trouble is experienced on lawns and greens which have not been properly drained, or which are shaded, or where the soil has not been enriched before laying down the grasses. It is obvious, therefore, that control of weeds in such places must be kept in view from the time that the lawns are being established.

In the case of bowling-greens and golf greens special care should be exercised to see that they receive direct sunlight throughout the whole of the day, particularly during the winter months, and also that they are thoroughly drained by means of agricultural drain pipes placed below the ground. The soil should also be enriched either by adding a better class of soil or by heavy dressings of well-rotted animal manure. If these precautions are adopted and high-grade seed, free from weed seed, is sown thickly, little trouble will be experienced from weeds. Subsequently, a vigorous growth of the grass should be encouraged by frequent watering and by top-dressing with well-rotted animal manure composted with soil.

When such dressings are being made, care should be exercised to see that all weed seeds have been destroyed in the compost. This can only be done by composting the soil and manure in heaps which can be kept under observation for some months. If it is not possible to ensure that the composts are free from weed seed, it is preferable to use artificial fertilisers for top-dressing.

Despite the greatest care that is taken, however, weeds will occasionally appear in lawns, and they must be immediately hand-pulled. If care is exercised in this direction, no great difficulty will be experienced in keeping the weeds under control. Clover is often troublesome in lawns, and this can be checked to some extent by top-dressing with sulphate of ammonia, which does not encourage the growth of clover, but stimulates the growth of grass, which checks the clover.

Superphosphate and lime should not be used on lawns which are likely to be infested with clover, as they stimulate the growth of clover.

Chemical exterminators cannot be recommended to any extent for control of weeds on lawns, but they can be used, particularly arsenic preparations, for killing individual plants such as paspalum grass. A little of the preparation should be dropped on the middle of the plant.

## THE FARM HOME.

### PURITY OF FOODSTUFFS—SOME SIMPLE TESTS.

Thanks to the efforts of the authorities that are responsible for the purity of our foodstuffs, the adulteration of commodities is not so common as in the past, says the "Journal of Food Industry," London. Unfortunately, however, impure foods are still on the market. The following tests will enable buyers to determine if the foods they are receiving are pure or otherwise.

The expert coffee taster can tell by simply tasting the beverage if chicory has been added, but to the ordinary consumer this would not mean much. An infallible test is to place a teaspoonful of the dry coffee in a tumblerful of cold water, stir well with a spoon, and leave for a minute or so. If the water remains clear the coffee is pure, but if it takes on a brownish tint chicory has been added. The darker the brown tint the greater the amount of chicory that has been added.

To test the quality of sugar, burn a sample in an aluminium spoon over a gas jet. If the sugar burns away entirely it is pure, but if any ash remains adulterations have been added.

The best way to test olive oil is to pour a quantity into a small bottle, add an eighth of the quantity of household ammonia, and shake well. If the mixture assumes a milky mass the oil is pure, but if it has a granulated appearance other oils have been added.

The simplest test for butter is to place a little in a spoon and hold it over a gas jet. If the butter boils evenly it is pure, but if it splutters and a scum appears margarine has been added.

To test flour, press a sample in the hand; if, when the hand is opened, the flour retains the impression of it and appears slightly yellow it is pure, but if it falls into powder and retains its usual colour adulterations have been added.

A good way to ascertain if milk has been "creamed" is to skim it after it has stood for an hour or so. If after the skimming a slightly bluish tinge appears round the edges, the milk is all right, but if the edges appear as before, the milk has been "creamed." To test if water has been added to the milk dip the point of a well-polished needle into it, and withdraw, holding the needle perpendicular, with the point downwards. If the milk adheres to the point it is pure, but if all of it drops off water has been added.

## THE GARDEN SPIRIT.

Quoting the words of him who coined the phrase "The Garden with a Soul."—"Each year provides a novel interest with something different to look at in addition to one's old loves!"

Says Shakespeare: "I doubt this garden lacks no flowers to make a garland of, in any season." It is a place for strengthening a weary spirit, for dreams and fancies where the murmur of a stream, the hum of the bees, and the song of the birds

fill the air with their music. Francis Bacon said: "It is nothing for great princes (the wealthy) that for the most part, taking advice with workmen, with no less cost set their things together for state and magnificence, but add nothing to the true pleasure of a garden." "God Almighty first planted a garden and, indeed, it is the purest of human pleasures; it is the greatest refreshment to the spirits of man; without which buildings and palaces are but gross handy-works." Bacon was writing of no ready-made thing, filled with masonry, when he penned the famous words—"Whoever owns a garden has one chamber roofed by heaven, in which the poet and the philosopher can feel at home. An increasing happiness—a little pleasance of the soul by whose wicket the world can be shut out, and where something of the Golden Age lingers."

Such a garden as this will, like Shakespeare's "Rosemary and Rue," keep its seeming and savour, and ever be to all who enter it—"Full of Grace and Remembrance."—"The South African Gardening and Country Life."

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## MARKET GARDENING.

### JERUSALEM ARTICHOKES.

This valuable plant seems to be little known in Queensland, and still less grown and used, and yet it is an excellent esculent for man as well as a first-class food for domestic animals. The stems, leaves, and flowers bear a great resemblance to the well-known sunflower of the same family.

The plant is propagated by tubers. It is not at all exacting as regards soil, and will grow in almost any situation, excepting low-lying, ill-drained soils. The best crops are obtained from rich, friable, sandy loams. The cultivation is extremely simple, and does not require any extra care or skill. The land should be turned as for potatoes—that is, deeply ploughed and thoroughly pulverised. The smallest tubers are planted in the same manner as potatoes. Hilling up is not essential, but it is an advantage to mould over the soil at each cultivation. The tubers are very difficult to eradicate, consequently they should be put in some situation where they are not likely to prove troublesome. Four to five cwt. of tubers will plant an acre.

The tubers should be ready for digging in from four to five months. If not required for immediate use, they may be left in the ground and taken up at any time. If dug, they will not keep very long, without shrivelling up and becoming soft, but may be kept for a time by packing in layers of fine soil, sand, or ground charcoal if these substances are in a dry condition.

### ASPARAGUS.

This plant is a perennial, and a native of the seashore, thriving best in soils containing a large proportion of sand. However, the rich alluvial soils of river flats should produce asparagus of large size and good quality, therefore their composition may be imitated in preparing garden soil for this culture. Although asparagus can make use of large quantities of water when growing, it requires a well-drained soil, for anything approaching stagnant water is fatal to the plant. Asparagus may be propagated by root divisions; it is preferable, however, to raise the young plants from seed sown in early spring, allowing them to remain in the seed-bed for at least two years. As soon as the roots are large enough, they may be transferred to their permanent positions, the soil of which should be previously well trenched and manured. The best results, under local conditions, will be obtained by making a drill of sufficient width, and about 6 inches in depth, with a slight ridge in the middle; the root should then be carefully lifted and trimmed of any damaged parts, and set in the trench saddlewise, with the point of the roots tending downwards. Cover to a depth of 3 or 4 inches, and firmly press the soil about the roots; where possible mulch with a thick coating of stable manure. During the early stages of growth it will be found advantageous to give copious watering during dry periods. The first growth is allowed to seed, the tops being cut down when they begin to show signs of yellowing. The mulch can then be lightly forked in, and during the winter a fresh supply may be applied. In these operations the depth of soil may be slightly increased over the roots; this will ensure long blanched heads of fine appearance. It is not advisable to cut too many heads until the third year, and cutting should cease in good time, in order to avoid the premature exhaustion of the plant. Sufficient tops must be left to mature, and thus stimulate the growth of the plant in general. The variety recommended for general use is Connover's Colossal.

## FRENCH BEANS.

A considerable variety of beans are grown in Queensland. As far as market gardening is concerned, the principal sort is undoubtedly Canadian Wonder. This French bean appears to suit our conditions to a greater extent than any other, and produces good, long, green pods in great profusion.

As French beans are one of the crops that pay, some attention must be given to the preparation of the land. Market gardening at all times demands good cultivation, and the free use of well-rotted stable or other manures. To apply a heavy coat of such manures to land in which it is intended to grow French beans will, in most instances, induce the plant to produce a lot of foliage, and consequent loss of bean pods. It therefore follows that the land should be in good heart, and preferably that which has been heavily manured for a preceding crop. If this is impossible, a light dressing of artificial manures, rich in phosphates or potash, will have a beneficial effect. The usual practice of planting is to strike out shallow drills and drop the seed by hand, covering them up with a light harrow. It is possible to adapt a maize-planter, by fitting it with a special plate, thus saving a considerable amount of labour. The one idea before every grower should be to limit the area to that which he can keep free from weeds, and not so big as to be neglected during picking time. In order to get the most out of the plants, the beans must be gathered as they become fit—that is, when young and tender—otherwise they will begin to form seed and cease to bear marketable beans.

The Chinese gardeners are most particular as to the quality of the bean seeds they purchase, and it is well to note that seed grown in Queensland often contains bean weevil. These beetles lay their eggs on the growing crop, and their presence is not noted until after the crop has been harvested and threshed. As diseased pods and stems left on the ground will provide infection for the new crop, it is desirable to collect and burn all such refuse, and sow clean seed only. Any seed affected with insect attack should be rejected.

In many parts of the State it is difficult to raise a good crop during the hot summer months, owing to the ravages of a small fly, the grubs of which travel in the stem. These can easily be found if the skin of a beanstalk be carefully peeled with a sharp knife. There is not any known commercial remedy, but the hilling up of the stems with soil will often be found to be effective. Strict attention, as stated, must be paid to the destruction, by burning, of all plants immediately a crop is harvested, also of those which show signs of wilting during growth. Rotation of crops must be practised where this trouble manifests itself.

It is as well to note that horse work should not be started in the early morning, when the crop is wet with dew, neither should it be attempted after a shower. Sufficient time should elapse to allow the plants to dry, otherwise the spores of some diseases will be easily scattered, the rainy season being the most favourable time for their spreading.

The principal varieties suitable for market are Canadian Wonder and Burpee's Stringless Greenpod.

## LIMA BEANS.

These are often called shell beans, as the part cooked is the seed in its green state. When harvested they are in good demand, the dry beans being soaked in water for a few hours and then cooked as haricots. As the Lima varieties succeed in dry, hot weather, the extension of their culture will no doubt be made, as soon as growers and buyers are more acquainted with their use. They do not require any special culture or attention; if kept well picked they will produce pods for a considerable time, provided that the crop is on fair soil and kept cultivated and free from weeds.

## BROAD BEANS.

Broad beans may be grown in the cooler parts of Queensland, doing well on heavy land. Unlike French and Lima beans, they easily respond to nitrogenous manure. Being a winter crop, they will not require as much cultivation as French beans, and under suitable conditions will prove a paying proposition. Their cultivation on a large scale, however, is not recommended unless a ready market is available.

From May to June is the best time to sow.

## BEETROOT.

Good beetroot may be grown in almost any kind of soil, provided that it is well broken up, and not of too stiff and clayey a nature; but the best beets are produced in fairly rich, dry, sandy loam soils. As in the case of the carrot and parsnip, fresh, new manure should never be used for beetroot. If manuring is

necessary, it should be done some time before the seed is sown, and be well mixed with the soil. The seed may be sown for the winter crop in February or March, and for the summer crop in August or September; or, by sowing a little every six weeks or so, a constant supply can be kept up all the year round. When thinning the plants, any blank spaces which may occur in the rows can be filled up, as beet stands transplanting well.

Varieties recommended: Crimson Globe and Egyptian Turnip-rooted.

## CABBAGES AND CAULIFLOWERS.

Most of our cultivated vegetables and fruits have originated from comparatively worthless beginnings, and there is no more striking example of what can be accomplished by means of cultivation than is presented to us by the cabbage and cauliflower—in fact, by most of the cultivated plants of the cabbage family. It has, of course, been a process of evolution for hundreds of years, by hybridisation and by selection, that the fittest have survived and to-day exist in their present useful form.

### Cabbages.

Under certain conditions, cabbages can be grown in most parts of Queensland. They naturally, however, come to the greatest perfection in the colder districts. The conditions which best suit the cabbage are: A rich soil, deep cultivation, and plenty of water, besides thorough after-cultivation. If the soil be not naturally rich, it must be made so by working in quantities of good well-rotted stable and cowyard manure, and the soil fertility can also be still more increased by adding some dried blood manure. The first thing to be done, however, is to prepare a seed-bed, as already explained. Then sow the seed in drills about 1 foot apart, and cover them by shaking fine rotted manure or fine soil over them. Give the plants plenty of water as soon as they appear above ground, shading them, if possible, but do not keep them constantly covered, or they will grow up weak and spindly. In about four or five weeks they should be ready for planting out. This operation should, if possible, be done in showery, or at least in cloudy weather. If the ground is dry at transplanting time, a little water should be used to prevent the soil falling into the hole made by the dibble.

Before taking up the young plants, soak the seed-bed thoroughly, so that the former may be raised with little injury to the roots. If there be any aphis or grubs on the plants, plunge every part of them *except the roots* in tobacco water. Trim off about half the leaves, as these would drop off and decay in any case, but before doing so would act prejudicially by using up the moisture in the ground.

When the plants are taken out of the seed-bed, place the roots at once in a puddle made of soil and water, in the bottom of a bucket, so that when carried out on to the field, the roots may not be exposed to sun and wind. The handiest implement for planting is a wooden dibble, made out of the handle of an old spade or fork. Some care must be taken in putting in the plant. The hole made by the dibble should only be deep enough for the plant. See that the roots reach the bottom, turn in a little soil, and then draw the plant slightly upwards before pressing the rest of the soil firmly round it. This ensures that the main root will not be doubled up, which would have a bad effect on the maturing plant. Should dry weather continue, constant watering will be necessary, but by the use of mulch the labour of watering will be considerably lessened. A well-grown cabbage will occupy a space of about 2½ feet; therefore give plenty of room. Leave 3 feet between the rows each way for the large varieties, and 2 feet for the smaller ones. To avoid the trouble of hilling up, the plants may be set in the bottom of a shallow furrow. Thus they are to some extent protected from the sun, and will not require hilling up, as the gradual filling up of the furrow during subsequent cultivation will do all that hilling up performs, and do it better.

The great secret of success in cultivating plants of the cabbage family is to *keep them constantly growing*, and never allow them to be checked by any cause whatever. Keep them on the move by regular cultivation, and plenty of water. About twice a week give them a watering of liquid manure, which will help greatly to promote rapid growth. Insect pests are most troublesome when plants are checked in their growth from some cause or other.

If cabbage plants take too long to mature, the heads, instead of being tender and succulent, become tough and leathery. Good tender cabbages should only take at most four months to be ready for the table. To ensure success, keep the ground clean, and conserve the moisture by constant cultivation. Do not wait till you see weeds to cultivate, but do it after every shower of rain, until the plants get too large to allow of implements being used among them. In the cooler parts of the

country, cabbages may be grown all the year round, but in the warmer districts it is hardly worth while growing them in the summer months, as there are so many insects and other pests to contend with that a great deal of the profit is lost in keeping the plants clean.

Cabbages derive much benefit by the application of lime to the soil every second year, using either slacked lime or pulverised limestone, at the rate of 15 and 30 cwt. per acre, respectively.

In the warmer districts, the first sowing may be made in January or February, and then, at intervals of a month or so, up to August or September.

The varieties most suitable for marketing are Henderson's Succession, Burpee's Surehead.

### Cauliflowers.

Cauliflowers thrive during our coldest months, and should, therefore, be planted out in time to ensure their heading in that season. The best time for sowing the seed is between the middle of February and the middle of March, as cauliflowers occupy the ground from five to six months, and should be in head in the coldest weather. If any is sown after April, it must be an early variety, which will mature before the weather gets too hot. The seed is sown in the same way as cabbage seed, and the planting out is also done in the same manner, but more care is required in transplanting than in the case of cabbages. The soil must be of the richest, and cauliflowers do better in virgin soil than elsewhere, provided the ground is thoroughly dug over to a depth of 15 inches and well pulverised. Cultivation should be thorough and fairly deep until the plants begin to head, or until the leaves spread so much that they are liable to be broken by the cultivating implements. As soon as the heads begin to form, cultivation may cease, because, if still carried on, there is a tendency for the heads to grow loose and coarse, instead of firm and compact. At this stage water is more essential than ever, and a good watering with liquid manure twice a week will add greatly to the bulk and quality of the crop.

It should always be borne in mind that the market value of cauliflowers depends entirely on their being of fair size and *white* and tender. To secure the whiteness of the head, as soon as the heads begin to form the leaves may be drawn together at the top and tied or skewered over the heads. This will protect them from the sun and cause them to be properly blanched.

When cutting the matured plants, the work should be done early in the morning, while the dew is on them, as they keep fresher for a longer period than if left till the sun gets hot.

The following indications will show when a head is ready to cut:—

The leaves bulge out considerably at the base, and the head begins to lose the polished smooth appearance which has hitherto characterised it, and becomes grained and somewhat irregular. To examine the head, it is not necessary to untie the top leaves, but part them at the side, so that, if not quite ready, cutting may be deferred until the next day. Cut with 2 inches or 3 inches of the stalk, and two or three circles of leaves.

Handle very carefully, and take care not to bruise the heads in any way, as even a slight bruise soon becomes black, and this detracts greatly from the market value. It is said that cauliflowers may be preserved for some time after the crops are over by attention to the following directions:—

Pull the plants up by the roots a day or two before they are ready for cutting. Tie the tops of the leaves loosely together; then place them in a cool shed; cover the roots with damp sand or sandy soil, and the heads will keep quite fresh for several weeks.

Cauliflowers should never follow a cabbage crop, nor be grown two seasons following on the same land.

The varieties recommended for market gardening are:—Primus, Eclipse, Early Italian Giant.

### Insect Pests.

Both cabbage and cauliflower are subject to the attacks of insect pests, which either eat the heart of young plants right out or riddle the leaves, and render them unsightly. Paris green sprayed on the plants immediately the larvæ are discovered will destroy them. Aphides are a great source of trouble, and should be promptly dealt with. Weak kerosene emulsion or tobacco water will destroy aphides easily. It should be borne in mind that Paris green, being an arsenical poison, must not be used on crops of this kind within five or six weeks of their being ready for market.

# Farm Notes for November.

Field.—Farmers are commencing to realise that quick-manuring wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kaffir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghums have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

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# Orchard Notes for November.

## THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools

being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil, and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young papaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit it appears to be covered with a grey dust, and if the fruit is examined with a good lens, it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime-sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be

continued, and all pip fruit trees must be bandaged at the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

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# ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | October, 1929. | | November, 1929. | | Moonrise Oct., 1929. | Moonrise Nov., 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | a.m. | a.m. |
| 1 | 5.35 | 5.49 | 5.4 | 6.8 | 4.32 | 4.42 |
| 2 | 5.34 | 5.49 | 5.3 | 6.9 | 5.6 | 5.6 |
| 3 | 5.33 | 5.50 | 5 3 | 6.9 | 5.39 | 5.50 |
| 4 | 5.31 | 5.51 | 5.2 | 6.10 | 6.11 | 6.30 |
| 5 | 5.30 | 5.52 | 5 1 | 6.11 | 6.43 | 7.15 |
| 6 | 5.29 | 5.52 | 5.0 | 6.12 | 7.16 | 8.4 |
| 7 | 5.27 | 5.53 | 5.0 | 6.12 | 7.52 | 8.57 |
| 8 | 5.26 | 5.54 | 4.59 | 6.13 | 8.36 | 9.49 |
| 9 | 5.25 | 5.54 | 4.58 | 6.14 | 9.27 | 10.38 |
| 10 | 5.24 | 5.55 | 4.58 | 6.15 | 10.13 | 11.40 |
| | | | | | | p.m. |
| 11 | 5.23 | 5.55 | 4.57 | 6.16 | 11.6 | 12.36 |
| 12 | 5.22 | 5.56 | 4.57 | 6.16 | 11.59 | 1.33 |
| | | | | | p.m. | |
| 13 | 5.21 | 5.56 | 4.56 | 6.17 | 12.55 | 2.29 |
| 14 | 5.20 | 5.57 | 4 55 | 6.18 | 1.52 | 3.28 |
| 15 | 5.19 | 5.57 | 4.55 | 6.19 | 2.50 | 4.30 |
| 16 | 5.18 | 5.58 | 4.54 | 6.20 | 3.47 | 5.33 |
| 17 | 5.17 | 5.58 | 4 54 | 6.21 | 4.45 | 6.43 |
| 18 | 5.16 | 5.59 | 4 54 | 6.22 | 5.45 | 7.52 |
| 19 | 5.15 | 5.59 | 4.53 | 6.23 | 6.47 | 9.0 |
| 20 | 5.14 | 6.0 | 4.53 | 6.23 | 7.52 | 10.4 |
| 21 | 5.13 | 6.0 | 4.53 | 6.24 | 9.2 | 11.3 |
| 22 | 5.12 | 6.1 | 4.53 | 6 24 | 10.8 | 11.53 |
| 23 | 5 10 | 6.1 | 4.52 | 6 25 | 11.13 | ... |
| | | | | | | a.m. |
| 24 | 5.10 | 6.2 | 4.52 | 6.26 | ... | 12.46 |
| | | | | | a.m. | |
| 25 | 5.9 | 6.3 | 4.52 | 6.27 | 12.14 | 1.15 |
| 26 | 5.8 | 6.3 | 4.51 | 6.27 | 1.8 | 1.42 |
| 27 | 5.8 | 6.4 | 4.51 | 6.28 | 1.54 | 2.13 |
| 28 | 5.7 | 6.5 | 4.51 | 6.29 | 2.33 | 2.44 |
| 29 | 5.6 | 6.5 | 4 51 | 6.30 | 3.7 | 3.14 |
| 30 | 5.6 | 6.6 | 4.51 | 6.31 | 3.39 | 3.39 |
| 31 | 5.5 | 6.7 | | | 4.10 | |

## Phases of the Moon, Occultations, &c.

| | | | |
|---|---|---|---|
| 3 Oct. | ● New Moon | 8 | 19 a.m. |
| 11 „ | ☾ First Quarter | 4 | 5 a.m. |
| 18 „ | ○ Full Moon | 10 | 5 p.m. |
| 25 „ | ☽ Last Quarter | 6 | 21 p.m. |

Apogee, 11th October, at 12.42 a.m.
Perigee, 23rd October, at 8.0 a.m.

The occultation of Venus by the Moon on the 30th, belongs to the northern hemisphere only, and it will occur when both are far below the horizon.

When the Moon sets, about two hours after the Sun on the 5th, it will be apparently near Alpha Libri; about 8 p.m., on the 7th, it will be not far from Antares, the brightest star in the Scorpion; on the 9th, it will seem to be in Sagittarius, whose bow will be to the eastward of it; on the 11th, still in Sagittarius, past the bow, and near to Capricornus; on the 13th, still in Capricornus, but near the border of Aquarius; on the 16th, it will be near the junction of Aquarius, Pisces, and Cetus. The Moon being full on the 18th, the stars in its neighbourhood will not be distinctly seen; on the 20th, at 8 p.m., it will be apparently in Aries, but still too bright to allow the stars of that constellation to be well seen; on the 25th, at 4 a.m., the waning Moon will be near Pollux, the brighter of the Twins; when, rising about an hour before the Sun, on the 31st, it will be approaching Spica, the principal star in Virgo.

| | | | |
|---|---|---|---|
| 1 Nov. | ● New Moon | 12 | 1 p.m. |
| 10 „ | ☾ First Quarter | 12 | 10 a.m. |
| 17 „ | ○ Full Moon | 10 | 14 p.m. |
| 24 „ | ☽ Last Quarter | 2 | 4 a.m. |

Apogee, 7th November, at 9·0 p.m.
Perigee, 19th November, at 3.48 p.m.

One of the most beautiful astronomical phenomena is an annular eclipse of the Sun. Such an event will occur on 1st November. It will not be visible in Australia, the negroes in Africa having an almost total monopoly. Other people in Egypt and South Africa will have only a partial eclipse. In England some view of the latter will be obtained.

During the eclipse the planet Mars will be at a distance of about one and a-half times the length of the Southern Cross to the east-south-east. Eighteen hours later the Moon will pass on the south side of Mars and apparently very close to it, but in reality Mars will be more than 300 million miles beyond it.

After sunset on the 5th the Moon and Saturn, low down in the west, will be not far apart, as two hours later the Moon will pass five degrees south of the planet.

When the Moon rises on the 18th, the day after being full, the planet Jupiter will be seen to be about five degrees higher.

On the 27th, Mercury will be passing from west to east of the Sun, a little more than the diameter of the Moon from it on its southern side.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXII. 1 NOVEMBER, 1929. PART 5.

## Event and Comment.

### Agriculture in Queensland—A Quarterly Survey.

THE Minister for Agriculture (Hon. H. F. Walker) has received a report of conditions in the agricultural districts for the quarter ending 30th September, from the Director of Agriculture (Mr. H. C. Quodling). The report which covers a period terminating just prior to the recent rains in Southern Queensland indicated unfavourable conditions generally at the time, but these happily have now been dispelled in the southern section of the State by generous rains. On the Darling Downs the area planted to wheat was slightly in excess of that of last season, but the crop was showing distress as a result of the continued dry weather. Some of the early sown crops, particularly in the northern portion of the Downs, were being fed off by dairy cows or sheep. In the Maranoa district a number of individual crops had failed, but where attention had been given early in the season to the conservation of soil moisture, a light crop of grain will be harvested. Now that the conditions have altered, anticipated yields must greatly exceed the earlier estimate.

### Maize and Fodder Crops.

FAIR average yields characterised the maize crop, which is now practically all in the bag. Large acreages have been prepared for planting to maize next season in anticipation of favourable weather, and this is in addition to a considerable area already sown. Early sown potatoes also had reached a stage when rain was urgently necessary to save the crop, and these also benefited by the timely downpour.

An increase had been noted in the areas in dairying districts planted with green fodder crops, which have proved of great value to the dairying industry. Although the dry spell had followed a very severe winter, the condition of the stock and output of dairy products had been maintained by grazing off or hand-feeding these crops. In view of the necessity of feeding off in the green state practically no fodder was conserved, and in most districts there was very little carry-over of silage from the previous season. Good draught horses were very much in demand on the Downs, and active draughts brought fair prices.

## In the Northern Division.

IN the Northern Division of the State the three months period, according to a report from the Senior Instructor in Agriculture for that division (Mr. N. A. R. Pollock), proved to be practically rainless except for light falls well below the average for each month in the wet belt, Ingham to Cooktown. The grass and water were plentiful generally, but beginning to go off and much of the dry feed had been burnt in parts. The pasturage generally on the Atherton Tableland was better than usual for the time of the year, and all dairy stock and pigs were in good condition. A lowering of output is expected until the advent of the wet season this month or next. The Tableland maize crop has been harvested and this is expected to show some decrease in yield.

The potato crop has been harvested on the coastal areas and the yield was from fair to good. There has been an increase in the area devoted to this crop, also to winter growing fodders, which have already been fed off or harvested. No silage had been conserved and little or no hay made in the course of the quarter under review.

Bacon pigs and porkers were in brisk demand, both from the factory and from local butchers. Fat cattle after the meatworks season are in poor supply and prices are on the upward curve. Store cattle are in good demand, but few are offering.

Ploughing and other preparation of land is being briskly proceeded with for the sowing of crops when seasonal rains occur.

Notwithstanding that the winter was long and severe the average production of dairy produce was well maintained up till the first week in October, when dry weather generally prevailed and a shortage of fodder crops and fodder was in sight. The position, however, was relieved by beneficial rains of a general nature which greatly improved the outlook for the coming season.

An abundant supply of natural grasses and fodders at the beginning of winter prevented any serious reduction in the condition of stock during the cold weather. Preparations are well forward for the planting of fodder crops. In some districts large areas have been seeded and the favourable turn in the season assures a growth of green fodder and prospects of having a supply available for conservation are good. The output of dairy produce is on the increase in the North generally. The quality of the product shows an improvement which is attributable to more frequent factory deliveries due to increased output of cream, and to the generally cool conditions prevailing.

## Dairy Factory Improvements.

REBUILDING and improvements to dairy factories were accelerated, and the completion of two large modern factories at Beaudesert and Toowoomba is approaching. In a number of districts the progress made in establishing the necessary improvements for modern dairy farm equipment has been satisfactory and in keeping with the general expansion of the industry.

There is a sound demand for dairy cattle of good type and quality. The improvement of dairy herds by the use of purebred dairy sires is receiving more attention than formerly.

## Rural Schools and Home Project Clubs.

IN the course of a speech in the Legislative Assembly the Minister for Public Instruction (Hon. R. M. King) had this to say on rural educational activities:—

> Reference has been made to the splendid work carried out by the rural schools. In 1928 the enrolment was 3,281, and the average attendance 2,550. Those figures do not include the senior children who come to rural schools from

neighbouring primary schools by road or rail for instruction in certain subjects. Fourteen schools were in operation in 1928, three more were opened in the first half of this year, and it is proposed to establish further schools at Proserpine, Pomona, Sarina, and Atherton. In this connection I would like to make some reference to the splendid work achieved by the Country Women's Association, which from time to time has raised funds as contributions towards the establishment of rural schools in certain localities. For that the association is to be highly commended. Our rural schools are doing excellent work. They are established in centres where they are likely to be of the most use, principally in agricultural districts where the scholars will probably undertake farm work when their school days are done. They are instructed in things which will make them more adaptable to the occupations they will follow, such as saddlery, sheet metal work, and carpentry, whilst, on the other hand, the girls are instructed in domestic science in subjects such as cooking, laundry work, and jam-making. This is very useful instruction indeed, and I think that it will help to make life on the land not only more congenial and happier, but also far more effieient and productive. I think the idea of the rural school is a splendid one, and I am very glad to see it in operation. I can assure the Committee that it will be encouraged to the best of my ability, because I think splendid results will accrue from it.

In connection with rural schools, I think it right to mention the home project clubs, which were mentioned by the hon. member for Fortitude Valley. These are partly educational, partly economic, and were introduced into schools to develop and foster the interest of the children of the rural districts in agricultural, stock, and farm matters. To show hon. members how the idea has caught on and is becoming more popular as time passes, let me quote the following figures:—

| Year. | Number of Clubs. | Total Membership. | Number of Schools. |
|---|---|---|---|
| 1927 .. .. .. | 74 | 546 | 53 |
| 1928 .. .. .. | 121 | 897 | 73 |

I cannot say what is going to happen this year, but I venture to predict that there will be a total membership of 1,000 in probably 100 schools.

It is very pleasing to note that the pupils of the home project clubs display an extraordinarily keen interest in their work. They are doing their work scientifically; they are doing it on second economic lines; and they seem to vie with one another in securing the very best results. In connection with these clubs, I desire to express my thanks to the different agricultural shows for the encouragement given to these clubs, and particularly to the Royal National Agricultural Association, Brisbane.

## Cane and Vegetables.

SOME cane farmers on the Lower Burdekin are giving attention to vegetable-growing and other crops. On Rita Island and round about Jarvisfield, small areas are being cropped for tomatoes, cucumbers, and potatoes with good financial results. In fact some of the growers have already entered the export trade and one recent shipment included well over a thousand cases of tomatoes from those localities. The growers have formed a sub-branch of the Bowen Fruit Export Society. A very fine display at the last Ayr Show of tomatoes, cucumbers, and other vegetables was a striking testimony to the suitability of the district's soil for such products, and was a praiseworthy effort on the part of the growers to arouse the interest of farmers generally in the wisdom of engaging in other lines of agriculture as well as sugar-cane.

# Bureau of Sugar Experiment Stations.

## CANE PESTS AND DISEASES.

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received from Mr. A. N. Burns, Assistant Entomologist at Mackay, the following report for the month ended 12th October, 1929:—*

### Occurrence of New Guinea or Weevil Borer (*Rhabdocnemis obscurus* Boisd.) at West Plane Creek, Sarina.

During the past month attention was drawn to the occurrence of this pest on two farms which adjoined each other, at West Plane Creek. An inspection of these farms was, therefore, carried out so as to ascertain the extent of the damage and find out if control measures were necessary.

The areas attacked lie on either side of a scrubby creek, bordered on their other sides with scrub-covered hills. Some of the latter had been cleared years ago and planted with cane, and now much volunteer cane is growing amongst the young second growth scrub. Some of these old canes had been introduced from the more northern areas, and it is very likely that the borer found its way to this particular locality with the introduction of these canes years ago. With these volunteer stools growing amongst the grass and scrub, they no doubt form an ideal breeding ground for the weevil borer, and it is obvious that infestation is maintained in this area through these canes.

The infested cane on both of the farms under question was Badila, and the degree of infestation was only moderate, and was confined chiefly to the basal portions of the sticks or to sticks which were lying down and covered with trash and rubbish. It was accordingly decided to make arrangements to have a consignment of Tachinid flies (*Ceromasia sphenophori* Vill.), which are a natural parasite of this borer, liberated in this area. These flies will breed in the cultivated canes as well as in the volunteer cane; this should greatly lessen the infestation in future seasons and act as a check on the spread of the borers.

In the cane areas north of Ingham, the beetle borer comes probably second in importance as a cane pest after the notorious greyback beetle grub, but very fortunately the Mackay district, taken as a whole, is, comparatively speaking, free from any serious outbreaks of this pest. It has been recorded from Silent Grove, Kungurri, Kolijo, Foulden, Rocklea, Finch Hatton, and West Plane Creek. In each instance the attacks appeared to be confined to Badila cane, and in the far north this appears to be its favoured variety. There is no doubt that further records of borer occurrence will be forthcoming from different parts of the district in the future.

In view of this, any growers who observe these borers in their canefields are requested to bring the same under the notice of the Sugar Experiment Station, Mackay, so that if necessary arrangements may be made to have Tachinid flies liberated on their farms, and thus prevent further spread of this pest. When flies are liberated it is necessary for the grower to leave a small block of the borer-infested cane as standover for the flies to breed in during the growing period of the other cane. Less than a quarter acre is sufficient to leave for this purpose, and care should be exercised to see that the "standover block" is not burnt whilst burning trash, &c.

Many growers may be troubled with large moth borers in their canefields, and may therefore not be sure if it is beetle borer or not that is attacking their cane. In order to assist them in correctly determining between these two borers the following brief descriptions of each one should be of assistance. It must here be pointed out that liberations of Tachinid flies are no use at all for controlling moth borers:—

### Large Moth Borer (*Phragmatiphila truncata* Walk.).

The larva or caterpillar of this insect attacks either the mature cane sticks or the young shoots; in the former case it is soft varieties such as H.Q. 426 or B. 208 that are usually attacked, and the injury almost always occurs fairly high up in the stick and often in the vicinity of a node. The moth borer caterpillar when fully

grown measures approximately from 1⅛ to 1¼ inches in length; it is of a light pinkish or purplish brown colour, with a brownish yellow head. These caterpillars when removed from their tunnels move fairly rapidly with the usual undulating caterpillar movement. The change into the chrysalis which is dark brown and about ⅝ inch long, may take place in one of the old tunnels, beneath lose leaves or trash, or just below the surface of the soil. When the attack occurs in mature sticks pupation then usually takes place under clinging trash, &c., but when the injury occurs amongst young shoots, the caterpillars enter the soil to pupate. From these pupæ, greyish brown moths with a wing expanse of about 1 inch emerge. Though plentiful enough, these moths are not often noticed on the wing. Some species of stout grasses, also corn and sorghum, are recorded as being also attacked by caterpillars of this insect.

**Weevil Borer (*Rhabdocnemis obscurus* Boisd.).**

The adult beetle borer measures a little over half an inch in length, and is of a dark brown or ochreous colour with a large central black marking on the thorax, and two rounded black patches on the back of the elytra or wing covers. The sides of the body as well as the legs are blackish. The head is produced into a curved snout or proboscis about ⅛ inch in length. This curved rostrum is a typical character in weevil borers.

The female borer makes a small tubular tunnel with its proboscis through the rind of the cane into the internal tissue and deposits an egg therein. The incubation period varies according to the season of the year, from a few days to a couple of weeks or so, and on emergence the young borer grub immediately commences tunnelling and feeding.

The fully-grown borer grub measures about, or a little over, half an inch in length in the natural semi-curved position; it is creamy white in colour with a brown head. It has no legs, and the body is stout and thickest near the anal extremity, to which the body then rapidly tapers. These grubs frequently move for long distances through the cane sticks, and their tunnels are invariably filled with shreds of fibre and grass. Before pupation these grubs assume a decidedly creamy yellow colour, and their bodies become slightly more elongate, they then form a cocoon of fibres and grass interwoven in one of the tunnels, and usually just below the rind of the stick. These cocoons measure approximately 1⅛ to 1¼ inches in length and about ⅝ inches in width. The time spent in the grub or larval stage varies from about five to six weeks to three months or so, being dependent upon the season of the year.

The pupa or chrysalis is enclosed within the fibrous cocoon, the pupa is almost inactive, being able to move its abdomen only slightly. It resembles in shape the adult beetle, with its legs neatly folded in front, and the wing covers are contained in two elongate bud-like processes. The newly turned chrysalis is creamy yellow in colour, it becomes darker as development progresses, until finally just before emergence, it is almost black. The time occupied in this stage is shorter during warm weather than in cold, but the average period may be estimated at about three weeks. The newly hatched beetle is soft, so it remains within the cocoon for a few days to harden up before commencing to bore out of the cane stick.

The New Guinea borer, as its name implies, was introduced from New Guinea, and as before stated, has now become a serious enemy of sugar-cane in northern Queensland. No artificial means of control have yet been devised, and as the damage occurs within the cane sticks themselves, a considerable amount of difficulty presents itself. The Tachinid fly (*Ceromasia sphenophori* Vill.) which is one of the borer's natural insect parasites (Dipterous) in New Guinea, has been successfully introduced into Queensland, and is bred at the Meringa Experiment Station, near Cairns, from which place liberations are made from time to time in borer-infested canefields. Already these useful flies are well established in the South Johnstone, Babinda, and Cairns districts.

The female fly deposits her eggs in the grass, &c., at the entrance to one of the borer tunnels, and the young larvae or maggots on locating a borer grub, enter its body and feed on its internal tissues, ultimately resulting in the death of the borer. Sometimes the parasitised borer is able to form a cocoon, but before it is able to pupate the fly maggots have destroyed it, and they then leave their host's body and pupate themselves. Their pupae are about 3/16 of an inch in length, and dark brown in colour, and cylindrical with round ends. They are called puparia. As many as five or six maggots may breed up inside one borer grub, so it can be seen that these flies breed fairly prolifically. The complete life cycle of the Tachinid fly occupies about six weeks.

*The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report (18th October, 1929) from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—*

## FALSE WIREWORM ATTACKING CANE SETS.

Amongst the several insects that attack cane sets when planted in early spring, and which, therefore, contribute towards an inferior strike, may be mentioned the false wireworm, which has been noticed on some farms this year.

The insect in question is about ¾ inch in length, thin and cylindrical, and it is of a shining creamy-white to light-brown colour and bears a superficial resemblance to a small millipede or "thousand-legs," although, of course, this insect has only six legs and would never be confused with the latter on that account. It can be readily distinguished from the true wireworm by the absence of the hard reddish-brown head and tail plate, and also by the fact that its jaws are directed downwards, whereas the jaws of the true wireworm project out in front of the head like a pair of callipers. This insect has the peculiar habit of "playing possum" or shamming death when touched. At first it gives a sudden wriggle and then remains quite motionless on the ground, and, if left alone, it will be seen burrowing back into the soil in a few minutes. It is most frequently met with in wet localities that have carried a fair crop of native grasses previous to being ploughed and planted with cane, and it usually occurs near the surface of the ground where the dry surface soil meets the moister soil underneath. It is thought that, in addition to eating into the cane sets, this insect lives on decomposing vegetable matter which is intermixed with the soil.

The beetles that are responsible for these so-called false wireworms are about three-eights of an inch in length, and of a blackish colour. Soon after their change to the beetle stage from the pupa, their wing cases become covered with the soil in which they have been living, so that they appear reddish-brown in red soils, greyish in the lighter forest soils, and a dirty black in the black clayey soils. The beetles can sometimes be seen scurrying across the ground in the daytime, and in wet weather they forsake the ground and climb trees or fence posts where they congregate in large numbers, particularly under loose bark or in any irregularities of the fence posts which afford them protection.

The wireworms are present in the soil during the winter, and as soon as spring comes, they commence to eat into the young swelling buds of the cane sets, their injury giving one the impression that a hot piece of wire had been pushed into the eye, and from the damage they inflict the eye fails to shoot.

Although generally they may cause some annoyance in wet localities by eating out a set here and there, only in odd cases do they cause extensive damage and make a re-plant necessary. When this happens it is a good plan to defer planting until October, when they are practically all full fed and on the point of changing to the pupal stage.

As a control measure, scuffling during the months of October and November is to be advised, since they pupate near the surface and the scuffler tynes account for several as this implement is being dragged along the cane rows. In addition, burning clumps of dead grass under which the beetles congregate will do much to lessen their numbers.

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*A MAGAZINE FOR THE FAMILY.*

*A Moggill farmer, in renewing his subscription for two years, writes (12th October, 1929) appreciatively of the Journal and adds: "It is not only myself who looks forward to the Journal, but my children also. Dad often has to play second fiddle in reading the contents, and when I do get hold of it I have to explain this and that, which shows clearly how even the kiddies take an interest in the Journal."*

# SCLEROTIUM CROWN ROTS.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

The fungus *Sclerotium rolfsii* is a soil-inhabiting plant parasite found widely distributed throughout the world. It shows very little discrimination as regards its selection of a host, and, so long as the conditions are such that abundance of warmth and moisture are provided for, it would appear capable of attacking a wide range of herbaceous plants. A few of the cultivated plants recorded in other countries as being attacked by the parasite are tomato, potato, tobacco, rhubarb, cotton, peanut, maize, citrus, strawberry, bean, carnation, violet, chrysanthemum. Acting as a storage rot, it may attack cucurbits, cabbage, and Irish and sweet potatoes. In Queensland *S. rolfsii* has appeared chiefly in commercial and private flower gardens, attacking delphiniums, carnations, and gerberas. It has also caused loss in some economic plants, including the strawberry, orange, and persimmon.

## Symptoms.

The fungus usually attacks its host at the crown just below ground-level. The outer tissues are invaded and a rot set up which may encircle the stem and spread down along the roots. The presence of disease then becomes manifested in a wilting of the upper portion of the plant. If the weather conditions are moist, the mycelial threads of the fungus will grow out together in a longitudinal direction to form white radiating fans which extend up the stem and outwards over the surface of the soil. Often there is associated with the white threads a number of small rounded brown bodies known as sclerotia (Plate 170).

In the case of the strawberry, the white mould growth can be seen amongst the bracts and leaf débris of the crown, and from here the radiating fungal threads extend out along the base of the leaf and fruit stalks, which soon assume a brown rotten condition, with the result that the leaves and fruit wilt off and die.

The orange and persimmon are affected in the seed-bed. At one or several points in the bed the seedlings commence to wilt off, and the trouble continues to spread in an ever-widening circle. On pulling up a wilted plant, the stem is seen to exhibit just below ground-level a dark shrunken area of decay associated with which is the fungus.

## The Causal Organism.

*Sclerotium rolfsii* is one of the few fungi which have never been known to develop a definite reproductive stage. For this reason it is included for convenience with several similar types in the group Mycelia-Sterilia.

The fungus is distributed by means of mycelial threads and sclerotia which are carried about in association with the remains of the host plant or in infested soil. The sclerotia are structures specially adapted to resist desiccation and other adverse conditions of their environment, and so serve to a certain extent the purpose of the spore of other fungi in the perpetuation of the disease.

*Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables" by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

PLATE 170.—GERBERA ATTACKED BY *Sclerotium rolfsii.*

In the formation of these sclerotia the fungal threads become aggregated at certain points, and branch and rebranch to give many short segments or hyphæ, which become interwoven to form a loose white cottony ball of somewhat less than $\frac{1}{16}$ inch in diameter. By further branching, interweaving, and fusion of the hyphæ a firmer structure is produced. This becomes differentiated into an outer firm, resistant layer or cortex in which the individual threads have become so fused together as to form a cellular structure somewhat resembling the parenchymatous tissue of higher plants. The interior or medulla consists of thinner walled hyphæ arranged in a somewhat looser manner. As the sclerotium matures its colour changes from white to light or dark brown, and finally takes the form of a firm rounded body of about $\frac{1}{10}$ inch or less in diameter, somewhat resembling in appearance a small round radish-seed.

### Control.

The soil-frequenting habits of this fungus make its effective control a somewhat difficult problem.

1. Pull out and burn any diseased plants.

2. Do whatever may be possible, by means of thinning out and pruning, to allow access of sun and air to the plants, as it is moist conditions that are specially conducive to the growth of this fungus. Good drainage and wide spacing of the plants will help in this direction.

3. To eliminate the fungus from the soil after it has become infected is a difficult matter. Taubenhaus in America has shown that the mycelium and sclerotia are apparently killed when buried more than 5 inches deep, and hence deep ploughing or digging-in of affected soil may be beneficial. Drenching the ground with lime sulphur solution may be useful in checking the disease in the seed-bed, while the same mixture sprayed well into the crown of strawberry plants may prove of use when this plant is attacked.

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## WHEN MAKING BORDEAUX MIXTURE.

If Bordeaux mixture is to give satisfactory results in the control of the many fungus diseases of fruit trees and vegetable crops for which it is used, it is important not only that it should be properly prepared, but that the ingredients be pure.

Samples of bluestone sometimes come on to the market which contain a quantity of sulphate of iron, and it is as well that the grower should know the difference. Bluestone proper should be in the form of dark-blue crystals, while the adulterated mixture is a lighter blue; indeed, the characteristic colour of sulphate of iron is a light green. The bluestone may be tested by dissolving a few crystals in water and adding a little ammonia. A pale blue precipitate is formed which dissolves to an intense blue colour, and the solution remains perfectly clear and free from sediment if allowed to stand for a while. If a reddish sediment settles, it is due to the presence of iron.

It is important that the lime used should be freshly burnt. To test whether it is so, a few lumps should be placed in a heap and sprinkled with water, when it will gradually fall to pieces, becoming very hot in the process, giving off a quantity of steam, and crumbling to a fine, white powder. Some lime may not crumble readily with cold water, but may do so with hot water. If it does not get hot enough to give off steam even with hot water, then the lime is unsuitable.

# THE BANANA INDUSTRY.

## NEW MEASURE FOR ITS PROTECTION.

*Better provision for the protection of the Banana Industry is the object of a measure introduced in the Legislative Assembly last month by the Minister of Agriculture and Stock (Hon. Harry F. Walker). Under it greater command of their industry is given to growers, while certain responsibilities are imposed upon its representatives. Subjoined is Mr. Walker's second-reading speech, somewhat abridged, on the Bill, and which is taken from "Hansard."*—ED.

### SPEECH BY THE MINISTER.

THE SECRETARY FOR AGRICULTURE (Hon. H. F. Walker, *Cooroora*): It gives me pleasure to move the second reading of this Banana Industry Protection Bill, because it is really the first Bill I have had the pleasure of moving in connection with an industry which particularly affects the growers in my own district.

### Historical Sketch.

In reading up the subject, I went back a few years to try to find out when bananas were first grown in Queensland, so as to get some idea as to their growth since. I came on a cutting from a newspaper which was written by a gentleman, whose name I will give directly, giving some idea of what the industry was forty-six years ago. He wrote thus—

> "The extent to which the banana is cultivated, and the number of human beings who are more or less dependent upon it for food in warm countries, is wonderful, equalling and perhaps exceeding that of any other known plant. It is one of the most useful plants in the world, and seems to have migrated with man wherever it would grow. It is for an immense portion of mankind what wheat and other cereals are for the inhabitants of Europe and Western Asia. It is one of the greatest blessings bestowed on mankind in hot climates."

That was written forty-six years ago by the late L. A. Bernays, the at-one-time clerk of this House, and father of our present respected clerk, in his work "Cultural Industries for Queensland," in which he gives some idea of the extent to which he had gone into the problem of the cultivation of a plant which has been growing successfully in Queensland ever since. Hon. members will see that it was grown in a great number of countries in the world prior to its introduction to any commercial extent into Queensland. At one time it was principally grown in the West Indies, the Canary Islands, Fiji, and other islands contiguous to Australia. We all know that only a few years ago most of the bananas consumed in Australia came from Fiji and other islands not far distant from our coasts, where it was grown under tropical conditions. In 1860, so far as the records show, no land was under bananas in Queensland. The growth of the industry since then is reflected in the following figures:—

| Year. | Acres. | Production. | Value. |
|---|---|---|---|
| | | Dozens. | £ |
| 1870 .. .. .. .. | 339 | .. | .. |
| 1880 .. .. .. .. | 410 | 706,560 | .. |
| 1890 .. .. .. .. | 3,890 | 22,002,092 | .. |
| | | Bunches. | |
| 1900 .. .. .. .. | 6,215 | 2,231,108 | .. |
| 1910 .. .. .. .. | 5,198 | 1,121,075 | 154,148 |
| 1920 .. .. .. .. | 8,981 | 1,198,121 | 349,452 |
| 1928 .. .. .. .. | 19,750 | 3,265,161 | 960,000 |

Hon. members will see from that table how the industry has grown, and the figures are more particularly interesting at the present moment on account of the efforts which have recently been made for the introduction of Fiji bananas to a greater extent than at present. It will be noted that the yield is in terms of dozens from the commencement of the records until 1899, whilst from 1900 to 1928 the return is expressed in bunches. It is only in later years that the annual value is given, and that fact alone gives hon. members some idea of the altered conditions in the industry, apart altogether from indicating its value to-day. Although the banana is a tropical plant, it has been largely grown on the southern coastal areas of Queensland from the Tweed River north. Its value has been recognised by all who take an interest in agricultural industries, including members who occupy seats on this side of the House, who appreciate its value on account of the cheap methods of cultivation which are suitable in the industry, the cheap way in which land can be broken up in comparison with other forms of farm life, and the fact that extensive and expensive machinery is unnecessary. It is well known to all hon. members that the industry has been pretty well established on the coastal areas of Queensland, where the mountainous country is particularly suitable for banana-growing. It has, however, suffered from disease. First of all, there was the weevil-borer. Later on "bunchy top" attacked the industry, appearing first on the New South Wales side of the border near the Richmond River. It rapidly spread to Queensland, and it was only men with some capital who were then able to engage in it successfully.

**The Value of the Industry in Land Settlement.**

To-day we see them successfully growing bananas, particularly under adverse conditions, with this dreaded menace rapidly overtaking them. One is really struck with these beautiful settlements, particularly in Queensland. New South Wales has had a painful experience with this dreaded disease, which almost wiped out the industry there, but it is pleasing to note that recently there has been a revival in that area. When one witnesses the settlement right along the north coast of Queensland as far north as Cairns, but particularly in the Gympie and Caboolture districts, up the Mary Valley, the Brisbane Valley, the South Coast, and along the tributaries of our principal rivers, one can realise what an advantage the industry has been to the Government, because the industry not only absorbed an enormous number of men who were in search of work, but it enabled men with small capital—men with no capital and many of our returned soldiers—to establish homes on small banana orchards. Roughly, an area of 5 acres is sufficient not only to provide employment, but in many cases to give a sufficient return to the grower. One can quite realise what a splendid adjunct this industry is from the point of view of land settlement, and from the point of view of absorbing labour. The small amount of capital required was a great advantage to the Government in that the Agricultural Bank could make the necessary funds available, and the settlers could immediately launch out in this industry, rquiring only a good strong arm, and probably a decent wife to help him. Banana culture does not demand the very best land. It is necessary only to have land suitable for the growth of the plant, so long as the soil contains suitable constituents. When I say it does not require the best land, I mean that it is not necessary to have the low rich alluvial flats required for other agricultural pursuits. All that is necessary is land situated on mountain sides, sufficiently high to be above the frost line, but not so high as to be subject to the cold winds prevalent in all countries. Bananas can be grown on the steepest and rockiest land. One marvels at the ingenious methods adopted by orchardists on the North Coast line, and to witness the clever means of conveying the fruit from one mountain side to another by aerial lines. The fruit is also conveyed by means of tramways and in other ways. Nearly all the fruit gravitates in one direction, which leads to a wonderful reduction in the labour required to work the holding. The fact that bananas can be grown on mountain sides presents the natural corollary that the land can be secured at a cheap rate, which is of great assistance to the beginner. It is a regular eye-opener to any person travelling on the North Coast line to see the place studded with banana plantations; and one is filled with pride at the sight of those Queenslanders, who have gone out with the object of supplying Australia with an absolutely necessary article of diet, particularly from the point of view of health. The Bill has been introduced to encourage that good work, and with a view to increasing production, having in view the absorption of unemployed labour which to-day is to be found in idleness in our streets. All that is required is a small amount of capital, and that can be secured from the Agricultural Bank. I strongly urge members of Parliament and members of agricultural organisations and co-operative bodies to do what I urged the miners of Gympie to do when I first became a member of Parliament. I urged upon them to get out into the country; but, comparatively few followed that advice. If they had done that, they would have been far better off growing bananas or dairying in the Gympie district than roaming all over Queensland and Australia

searching for work. I tender that same advice to-day. It is our bounden duty to demonstrate the possibilities of this industry to the man who is looking for a home. It is not necessary to have an expensive house. There are some hon. members in this Chamber who have taken up the attitude in connection with the Department of Public Lands that the enormous areas embracing State forests and timber reserves, particularly on the Brisbane River, the Mary River, and in our coastal districts—land that cannot be alienated except by Act of Parliament—should be made available for closer settlement.

### Banana-Growing and Forestry.

We can, with advantage to the grower and the State as well, advocate the growing of bananas in conjunction with the growth of pine trees. Here we have a system which helps the man with a little capital to go upon the land and make a good living. I do not think that pine trees can be grown in any other way under existing conditions in Queensland except in the form I have indicated; but I am afraid that the Speaker will not allow me to enlarge upon that system. Anybody who knows anything about banana-growing knows that it is an industry in which a man can easily become established. As soon as the man falls the scrub and burns the fall off in three or four months, he digs his holes and plants his banana-suckers. The banana plantation is then all ready for him. Fourteen months afterwards the trees will have sufficiently developed to enable him to commence to make money from them. The time has come when we should point out the advantages of banana-growing, knowing full well that we are now only supplying half the Australian requirements. We should launch out in the direction I have indicated with a view not only to supplying this market, but with a view to relieving the congestion on the labour market. It would be one of the most effective methods of dealing with unemployment that I know of, and more particularly in view of the advantages that the markets offer to the people of this State to develop the industry.

### The Call of Country Life.

I need not dilate any further on that side of the question; but I would like to emphasise the small amount of capital that is required to engage in banana culture. Beyond preparing the ground for the planting of suckers the banana-grower has only to purchase cases. No machinery is required, and there is a ready market for his products in the Southern States. Although the market fluctuates, nevertheless the prices compare very well with the prices obtainable for other primary products, while the remuneration the grower gets for his labour compares favourably with that of his neighbours engaged in other forms of primary production. The main thing is that the banana-grower is a contented man. I have no hesitation in saying that, when a man has lived in the bush and knows the privileges of bush life as I do, there is no occupation which can be compared with it for comfort and the pleasure derived. As I pointed out a while ago, a rough estimate of the value of the banana industry to Queensland is £1,000,000 per annum. It may be more, because no record can be kept of the fruit that is eaten in Queensland. That gives hon. members an idea of the importance of the industry. There is still more wealth to be produced from it. I would emphasise the fact that, since strict grading was enforced about twelve months ago, the benefit accruing to the fruit placed in the Southern markets has been enormous. Unless we are prepared to be up and doing and to take advantage of the opportunities now offering, we shall probably lose a trade which we can ill afford to lose. We shall have outside competition to meet, for, despite the high tariff, bananas are being imported from centres outside Australia, where, because of the cheap-labour conditions, they can be produced for a few pence per bunch. We want to go right ahead with the banana industry, because it is of vast importance to the State, and this Bill has been brought down with that end in view.

### Extension of the Industry.

I have spoken about the waste lands in this State; and I wish to emphasise that we can extend this industry further North. By waste lands I mean lands that are unsuitable for dairying and agricultural pursuits. It was one of my pleasures last year, when travelling through the North, to see that vast valley of beautiful land in the Tully district. It was truly remarkable to see that land, and I make bold to say that, so far as banana land is concerned, we shall not exhaust our resources in that direction for many years to come. Knowing that fact, there is nothing to stop the industry from going right ahead. What is wanted to-day is a step forward in order to catch the market we have down South, and in this manner obviate any attempt on the part of agitators to import bananas from outside Australia, which are grown under inferior conditions to those under which the industry is carried on in Queensland. . . .

The duty of 1s. 6d. per cental introduced in 1911 had some beneficial influence. The increased tariff of 1920 to 2s. 6d. per cental, and in 1921 to 8s. 4d. per cental, which placed the industry on a level with the protection given to other green fruits, was the means of stabilising the industry and placing it on a reasonably satisfactory footing.

### Proposed Board of Advice.

The first real difficulty met with by banana-growers in Queensland was the occurrence of the borer-weevil. I do not want to enter into a dissertation on the borer-weevil and "bunchy top," any more than I have already done in connection with the last Bill. The reason I mention them is to connect these particular menaces up with the board proposed to be appointed under this Bill. As a matter of fact, although the Bill is not law, we are practically working along the lines laid down here, rather than lose the season. In order that control measures might be started on right lines, the Government in 1920 appointed Mr. Froggatt, an entomologist, to investigate thoroughly the borer-weevil, and for the last eight or nine years his time has been exclusively spent on this pest. The department certainly did its best, with no apparent result to the present time. Going further, we must remember that "bunchy top" has played a big part in the destruction of our orchards. It is a crying shame to see the beautiful orchards that at times have been destroyed by this disease. We have to give assistance in the form referred to by the Bill, in order that the ravages of this pest may be restricted.

Probably hon. members know the seriousness of the leaf-spot pest in bananas; but they will realise it more when I tell them that it is 50 per cent. worse than the "bunchy top" disease.

The object of the present Bill is to create an organisation which will be specially charged with the business of improving and developing the most important section of the fruit industry of Queensland. The board will consist of four members, two of whom are to be appointed by the Minister and two by the growers. The Governor in Council will appoint the chairman, who will be a Government representative. The duties of the board will be to advise the Minister on banana problems, including the policy of the banana experiment stations; advising the Minister on scientific problems, such as "bunchy top," leaf-spot, and other diseases; aiding in the dissemination of information regarding bananas; and such other duties as may be entrusted to it. I have always found it advisable to take the public into my confidence. I have done so in the butter factory with which I am associated, because I find that it makes for the best results.

The board will administer the Diseases in Plants Act so far as bananas are concerned, and in that respect it will deal with abandoned or neglected plantations, with banana quarantine matters, with the issue of permits, with plant bananas, and with trafficking in banana suckers. In connection with the issue of permits, we have had a considerable amount of trouble in getting information expeditiously. That matter, however, has been tightened up to a great extent by the Under Secretary and other departmental officers. The main point is that we want to have a check on the work of the inspectors, and in this connection the board which is now functioning will do good work.

### Banana Experiment Stations.

There is also the policy regarding experiment stations. The board will make investigation, and then make certain recommendations to the Minister. The Minister has full power as to whether he will accept recommendations or not. It is for the experts to consider those recommendations, and the Minister will be advised by them. . . . . The duties of the board will also include the visiting of banana-growing districts from time to time. If any trouble arises, say, in the South Coast district, we shall send the members of the board there immediately. As a matter of fact, members of the board went out to Samford yesterday, where they did effective work. They reported three or four banana plantations as being infected. We are endeavouring to find the owners, and if we cannot do so we shall have to clean them up ourselves. The board will also aid in the distribution of information regarding bananas.

This brings me to the question raised by the hon. member for Barcoo (Mr. Bulcock), who said that we should get in touch with those who have gardens in which they grow a few banana trees, with a view to giving them information. That is a very excellent suggestion, and one that will be followed. The board will also furnish reports on matters submitted by the Minister, and perform such duties as may be required.

**Administration.**

Loading bananas to-day at the railway stations is rather expensive when you consider the work done by the loaders. They work half a day, say, twice a week, or at most two days a week, and for the remainder of the time there is nothing for them to do. We propose to appoint them as inspectors and also to do other work, and that will minimise the cost of loading, which is fairly heavy at the present time. The board will also administer the Diseases in Plants Act, which deals with abandoned and neglected banana orchards, quarantine, the issue of permits to plant, and trafficking in the sale of suckers. That is the most important duty, and one which the department should control. At the present time suckers may be sent anywhere without any supervision. After they leave the orchard it is hard to locate them. Only to-day the Under Secretary reported to me a case where a truck of banana suckers was sent from the North, only to find when they reached Southern Queensland that there was something wrong. That shows conclusively that men will traffic in these banana suckers, and it is hard to control them. The inspector in each district will keep in touch with the movements on all farms in his district. He will also advise the Minister in regard to abandoned or neglected banana orchards, and he should know whether an orchardist is keeping his farm clean or not.

The Inspectors' Board has sweeping powers, but I will not deal further with that subject, because I referred fully to it in connection with the Diseases in Plants Bill. Our object is to try to get these men to do dual work. The work is of an interesting character, which the inspectors should readily take up. In my opinion, our inspectors, no matter whether they belong to the Department of Agriculture or to the Department of Public Lands, should have a knowledge of the activities of the various State departments.

The Governor in Council may endow the fund to the extent of £1 for £1. A similar arrangement is now being carried out, and is working effectively. The question of a levy will arise later on; but the amount will be subject to the recommendation of the banana-growers. It is proposed to follow on the lines of a similar system which has been in vogue before.

**Compensation.**

The question of compensation is also dealt with under this Bill. I do not agree with what the hon. member for Barcoo said regarding quarantine areas; but he was on sound ground when he spoke of the compensation to growers, if we destroy not only unhealthy plants but also healthy plants. That is the policy of the department to-day. Any loss in respect to diseased plants must be borne by the individual concerned; otherwise there would be no incentive to his cleaning up his home.

**A White Man's Industry.**

In Queensland, banana-growing is a white man's industry. At the present time the industry supports approximately 16,000 white Australians—I include men who are growing bananas, and their wives and families and others indirectly concerned with the work. It is one of our principal industries to-day. It also provides work in connection with boxes, and for carters, railway workers, and distributors. One has only to watch the fruit trains going from Brisbane and loading at the various stations, to see the vast amount of work provided in that way. These fruit trains have been in operation for some years, and the industry could not possibly do without them. Bananas are carried to New South Wales and Victoria very quickly, taking into consideration the transhipments involved.

This Bill is purely complementary to the Bill which has just passed its second reading, and I have now much pleasure in moving—

"That the Bill be now read a second time."

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*THE JOURNAL AT SCHOOL.*

*A country school teacher writes (10th October, 1929):—"I wish to renew my subscription for the Journal. . . . . It has proved very interesting, and has assisted me largely in my nature study work."*

# THE WHEAT INDUSTRY IN QUEENSLAND.

## A COMPREHENSIVE REVIEW.

**Since assuming office I have been engaged in examination of the principal primary industries with a view to ascertaining the directions in which development is practicable. I am convinced that the greatest relief of the depression from which the country is suffering will lie in the fuller utilisation of our natural resources. A dissemination throughout the community of increased wealth taken from the soil would stimulate trade and increase the avenues of employment.—** *Hon. Harry F. Walker, Minister of Agriculture and Stock.*

THE present position and condition of the wheat industry in Queensland were reviewed by the Minister of Agriculture and Stock (Hon. Harry F. Walker) in the course of a recent statement to the Press, of which the following is the full text:—

### Queensland's Bread Needs.

Upon investigating the position of the wheat industry I find that the consumption of wheat in Queensland in the matter of the bread requirements of the people may be taken at approximately 5,000,000 bushels, exclusive of requirements for seed, poultry feed, and such like. Over a period of eleven years we have produced on the average barely half of these requirements. A doubling of the wheat production of the State would mean an increase in the income of the State of close upon £750,000 per annum.

### Dependence upon Southern States.

Some weeks ago alarming reports were received respecting the prospects of the wheat crop in New South Wales. Some reports went so far as to forecast that there was little likelihood of there being any surplus from New South Wales for export next season. Happily, rains in some districts have to some extent improved the outlook in that State. The situation during the dry period, however, served to focus attention upon the position in which Queensland would be placed in the event of a New South Wales wheat failure. If we do not have enough wheat for our own needs we would be dependent upon Victoria and South Australia for wheat for local consumption. From the standpoint of importation of flour, it is possible that Southern manufacturers might then take advantage of the situation by combining to treat Queensland as an artificial market and demanding artificial prices.

In any event the experience of history dictates that a State should produce its own bread supply. The fact that we have not been doing so in Queensland has impelled the Government to look into the position in an endeavour to correct this very unsatisfactory state of affairs. Probably Queensland will never be a great wheat-producing State as are some of the Southern States. But it is believed that existing wheat lands on the Downs and in the Maranoa, already served by railways, roads, &c., are capable of producing sufficient wheat for the needs of the State if reasonable encouragement were offered wheatgrowers.

### The Objective.

I have therefore adopted the objective of assuring the production by Queensland growers and the milling by Queensland mills of this State's bread needs. **Realising that such an objective cannot be achieved without the co-operation of those concerned in the primary and secondary industries, I convened a conference between the Wheat Board, as representing the growers, together with the millers, representing the secondary industry, in the hope of finding it possible to take definite steps in the direction of achieving the objective.** The conference sat at intervals throughout the month of September. Frequent adjournments were necessary.

**Past Misunderstandings.**

It appears that over a considerable period of years misunderstandings have existed as between the Wheat Board and the millers. It was not my purpose or desire in asking the respective interests to meet me to investigate all the details and causes of any such misunderstandings which have existed in the past. Rather the object was to see what could be done to create goodwill in the future, as in the absence of that goodwill I felt that the object of encouraging wheatgrowers to increase wheat production would be difficult of achievement.

It also appears that the lack of harmony which has obtained in the past as between the Wheat Board and the millers has resulted in—

(1) The Wheat Board having to retain considerable stocks of wheat of one season well into the next year.

(2) First payments by the Wheat Board to the growers being less than they might otherwise have been and final payments being considerably delayed pending realisation.

(3) Costs being sustained by growers through accumulating charges by double handling of wheat at country stations.

(4) Sustaining by the growers of additional interest and storage charges.

(5) Loss attendant upon the deterioration of the quality of the wheat.

(6) On occasion wheat being exported by the Wheat Board while Southern States wheat has been brought in by the millers.

(7) The market formerly enjoyed by the Queensland millers for Queensland flour being invaded by Southern millers.

Probably not all of these results have accrued in any one season, but some have operated every season.

**Importance of Markets.**

In any event before considering the advocacy of the increase of wheat production in Queensland, it was felt expedient to confer with the interests concerned in the marketing of the product so as to verify the opinions held to the effect that a satisfactory local market exists for increased quantities. In the embarking upon projects for increased production there has, in the past, been an inadequate regard for the markets available. It was desired in this instance to assure the market.

**Consideration by Conference.**

The conference between the Wheat Board and the millers duly assembled under my presidency on the 4th and 5th instant. It was considered—

Firstly—Whether it would be sound and practical to aim at the objective of a doubling of the wheat production; and

Secondly—Whether it was not possible to bring about a mutual understanding as between the Wheat Board and the millers.

As regards the first-mentioned consideration—namely, that of the practicability of increasing the State's wheat production—I am pleased to say that all interests concerned, both including the Wheat Board and the millers, as well as the technical officers of the Department appear to be united in the opinion that the objective is reasonably practicable and attainable.

## GENERAL PRINCIPLES.

With a view to facilitating discussion I submitted to conference an outline of certain general principles. For instance, I pointed out that, in the past, wheat has been received by the State Wheat Board and put into sheds or dumps at country stations and has later been taken out when required by mills, as a consequence of which double handling costs were involved, and sometimes also avoidable damage. It was further suggested that an organised transport arrangement be carried into effect involving the nominating of a special transport officer by the Commissioner for Railways during the wheat receiving season to co-operate to the fullest extent with the Wheat Board in marshalling and fully utilising rolling-stock with a view to reducing country storage and if possible to eliminate "dumping" and damage therefrom. It was also suggested that millers should undertake to store wheat at mills on behalf of the Board to the fullest extent, the millers to be responsible for the agreed intake weight of wheat, and all wheat as received at mills to be checked by a representative of the Board. As regards price, a suggestion was made that an understanding should be arrived at providing for a minimum grist by each mill

at a price to be fixed according to a formula based upon an agreed upon margin of so much per bushel above New South Wales country station values. I suggested that settlement might take place on the Wednesday of a given week in respect of the gristing up to Saturday of the preceding week, and that millers' gristing accounts would be subject to audit by the Auditor-General. It was intimated by me that, in the event of an understanding being reached between the parties to operate for a term of years with a view to affording the necessary assurance and encouragement to the growers, the Government would assist in the making of arrangements for a more attractive first advance to growers than has hitherto been the case, as well as to facilitate a quicker final distribution, the intention being to wind up one season's crop before a new season's crop comes in.

It was pointed out that the advantages which would accrue under such an arrangement if carried into effect seemed to be—

(*a*) That stabilisation as a result of a working arrangement between the Wheat Board and the millers would be an encouragement to growers on the Darling Downs to go in more largely for wheat.

(*b*) Wheatgrowers would be assured of full parity values for their product.

(*c*) The stabilisation attaching to the arrangement for a term of years would encourage millers to improve their plants, to provide more storage, &c., and generally to increase efficiency and reduce costs.

(*d*) The Wheat Board would be encouraged to reduce costs by saving of storage, handling, &c.

(*e*) The very heavy losses sustained through prolonged storage of wheat at country stations would be very largely obviated if not eliminated.

(*f*) Continuity of policy would be assured which would react favourably upon the growers.

(*g*) Millers would have adequate supplies of wheat at command of a better quality than that which was available generally in the South, and the continuous working which would be possible would tend to reduce millers' overhead expenses.

(*h*) Generally the increase of wealth through augmented wheat production and by increased consumption of Queensland-made flour would assist in relieving unemployment and add to the general prosperity.

The foregoing is a summary of the general circumstances which seemed to justify close consideration by the Government of the questions involved, and the determination to solve them, and the evolving of ideas to that end.

## AGREEMENT REACHED.

**I am pleased to be able to announce that a complete agreement has been reached between the parties covering a period of three years commencing with the coming season's crop. It was my concern throughout that any understanding should be fair to the grower in ensuring him of the full reward of his labours, just to the consumer, and not harsh upon the secondary industry. The price of bread in Queensland has for some time compared favourably with that ruling in the other States. I was anxious to make sure that this should not be departed from, and am pleased to say that the parity of bread prices will not be affected. So far as concerns the grower, it is generally known that Queensland has a natural geographical advantage. This has been secured for the producer.**

The following are the main points in the arrangement, namely:—

1. Queensland millers undertake to endeavour to increase the consumption within the State of flour made from Queensland wheat up to 4,000,000 bushels within the three-year period.

2. Pending the millers building up the trade referred to and for the first year, millers agree to purchase a total of 3,500,000 bushels of wheat (subject to the wheat being available) for gristing purposes. In addition to this there is a substantial trade for poultry feed, seed, and other purposes which should enable the absorption of a 4,000,000-bushel crop immediately, should we be fortunate enough to secure such a harvest from the crop now in the ground, while as a result of the co-operation of the Wheat Board and the millers it is hoped during the period of the agreement to approach the 5,000,000-bushel local market objective.

3. Feed wheat will be the subject of a separate arrangement.

4. To maintain to the growers the existing geographical advantage, millers agree to purchase wheat under a formula calculated to assure a gross realisation at Queensland country stations of approximately 8d. per bushel above New South Wales country station parity, or 1d. per bushel above Wallangarra or Sydney.

5. With a view to economising in the cost of operations, the Wheat Board has entered into an arrangement with the millers to act as acquiring agents at country stations or mills, as the case may be, for direct wheat, doing all the receiving, handling, storing, loading in, loading out, including the bearing of the responsibility for losses in weight and deterioration at a flat rate contract allowance on all wheat of 1¼d. per bushel. For the protection of the wheatgrowers all wheat will, however, be classified and weighed by Wheat Board's representative. The classification will be on the same basis as that which has obtained during the last two years, excepting with such modifications as may be mutually agreed upon.

6. The Board will bear costs of administration, interest on sheds, interest on bank overdraft, &c., but it is expected that, as a result of the arrangement which has been concluded between the parties, a very considerable economy in handling costs will be effected.

7. Millers have agreed to make available for the storage and protection of the wheat their entire mill storage capacity, estimated to be sufficient to safely house approximately 1,500,000 bushels. The Wheat Board has storage for approximately 2,100,000 bushels. The mills have a gristing capacity during the three months receiving season of anything up to 1,000,000 bushels unless there is undue uneconomic location. It appears, therefore, that sufficient storage exists to effectively protect and care for a 4,000,000-bushel crop. With a view to further ensuring adequate protection the existing Wheat Board's sheds will be mouse-proofed. Moneys for this purpose will be made available to the Wheat Board under the guarantee of the Government. In consideration of the millers making available their storage accommodation free of charge, the Wheat Board's sheds in the country are to be available free of charge to the millers. Acting as agents for the board and included in the flat rate charge of 1¼d per bushel, millers will temporarily dump wheat in rush periods and bear responsibility therefor. The millers also agree to take delivery of wheat promptly from farmers and as fast as they can deliver it, subject to avoidance of congestion.

8. The board will receive payment for wheat from the millers weekly on Tuesday of each week for the gristings up to Saturday of the previous week.

9. The millers' accounts in the transactions will be subject to audit by the Auditor-General.

10. With respect to any surpluses of wheat which may be produced over and above the local consumption demands, it has been arranged that the local millers will have the first refusal of such surpluses at a price to be mutually agreed upon. This is with a view to building up the local milling industry without prejudicing local wheatgrowers.

11. Millers will deposit cash or bonds based on their gristing capacity as a guarantee that they will carry out the terms of the agreement, the total amount thereof being £30,000.

12. With a view to promoting mutual understanding between the parties, a monthly conference will take place between the Wheat Board and the millers alternately at Brisbane and Toowoomba during the wheat receiving months of November to February.

13. Provision has also been made in the agreement for a system of arbitration to enable the prompt settlement of any differences.

14. It has been agreed that any abnormality in Queensland and New South Wales will justify a reconsideration of the price formula, and a tribunal is set up in that connection.

15. There is also an annual right of review of certain provisions.

The agreement between the parties was duly completed and signed, and those concerned appear to be satisfied with the results.

### Million Pound Credit.

It will be remembered that the Premier (Hon. A. E. Moore) announced in his policy speech that the national credit would be placed behind industries which were prepared to adopt self-help methods to bring about development without unduly leaning upon the Government. Since the primary and secondary sections of the wheat industry have so united in a common objective, the Government feels justified

in extending assistance along the lines promised by the Premier in his policy speech. The Government has therefore arranged with the Commonwealth Bank for a credit of £1,000,000 sterling per annum for the Wheat Board. The Government will also guarantee a first advance of 4s. per bushel *net to the grower* at country stations on all wheat of approved quality for the next three years up to 4,000,000 bushels. The moneys will be available to enable the growers to receive payment promptly, and if the board so wishes credit will be available so that growers who deliver wheat up to the 31st December will receive payment in the middle of January. Deliveries during January can be paid for in the middle of February, and February deliveries in the middle of March, in a similar manner to butter-factory pays. It has also been arranged that the millers will take over at the 15th September in each year any wheat remaining in stock, and will pay for same promptly so as to enable final distribution to be made to growers in the middle of September of each year. The arrangement means that not only will the grower be assured of a substantial first advance promptly after delivery, but also of an early squaring up of the pool, with an assurance to him of the full value of the wheat based on world parity plus Queensland's natural geographical advantage.

## MODERN METHODS OF FARMING PRACTICE.

It is hoped that the arrangement may encourage farmers in districts suitable to wheatgrowing to plan the preparation of extended acreages during the coming summer. I hope they will prepare the land well and in such a way as to conserve the summer rainfall so as to provide a good seed-bed for an extended sowing under favourable conditions in next year's planting season.

Not only have the Departmental activities demonstrated the practicability of regular production of wheat crops in Queensland, but many individual growers have been meeting with consistent success over a term of years by the adoption of modern methods of soil-moisture conservation. In order to further assist in this important matter I have arranged to extend the activities of the Roma State Farm, and will endeavour to arrange for a series of conferences of delegates from Local Producers' Associations to be held there at suitable times when the results of experiments may be brought definitely under notice. This will be in addition to the field days recently arranged. The system of conducting experimental plots on individual farms will be continued and extended where practicable. Every encouragement will be given to the more widespread adoption by farmers of dry-farming methods. The existing departmental arrangements regarding the propagation of varieties of wheat suitable for Queensland will be energetically continued.

### More Land under Wheat

I have arranged with my colleague, the Minister for Lands (Hon. W. A. Deacon), who is intimately familiar with the wheatgrowing industry, to initiate a survey of the lands available for closer settlement for wheatgrowing. I feel that there are many farmers' sons on the Darling Downs to-day, who, instead of coming to the cities to compete on the labour market, if given encouragement, would take up wheatgrowing, to their own benefit as well as to the great advantage of the State.

## MINISTER'S APPEAL.

**I also call the attention of the public of Queensland to the fact that Queensland millers can assist the wheatgrowers in the finding of an extended local market for their product only if Queensland people will ask for and give preference to bread made from Queensland flour. It has been demonstrated that Queensland flour is stronger and generally superior to many Southern flours. In asking for preference for the Queensland article, I am not, therefore, asking for preference for an inferior article but for one which (according to experts) is superior. I also appeal to the Queensland merchants and bakers. I ask them to be loyal to the State in which they earn their livlihood, and accordingly in placing their orders to give preference to those Queensland mills which are giving preference to Queensland wheat.**

It now remains to hope for the favourable rains which are now so necessary to ensure a bounteous season so that those wheatgrowers who at present have substantial areas under crop may be rewarded to the full extent which their labours deserve, and that they may be encouraged to continue the valuable work which they are doing.

## CLIMATOLOGICAL TABLE—SEPTEMBER, 1929.

Supplied by the Commonwealth of Australia, Meteorological Bureau, Brisbane.

| Districts and Stations. | Atmospheric Pressure. Mean at 9 a.m. | Shade Temperature. | | | | | | Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Means. | | Extremes. | | | | Total. | Wet Days. |
| | | Max. | Min. | Max. | Date. | Min. | Date. | | |
| *Coastal.* | In. | Deg. | Deg. | Deg. | | Deg. | | Points. | |
| Cooktown | 30·04 | 82 | 71 | 84 | 20, 29 | 57 | 12 | 26 | 5 |
| Herberton | .. | 75 | 52 | 84 | 21 | 30 | 12 | 28 | 4 |
| Rockhampton | 30·13 | 80 | 56 | 89 | 19 | 43 | 11 | 3 | 1 |
| Brisbane | 30·16 | 74 | 54 | 86 | 18 | 48 | 3 | 48 | 8 |
| *Darling Downs.* | | | | | | | | | |
| Dalby | 30·15 | 77 | 47 | 88 | 21, 22 | 31 | 3 | 8 | 3 |
| Stanthorpe | .. | 67 | 39 | 82 | 21 | 27 | 3 | 82 | 7 |
| Toowoomba | .. | 69 | 46 | 81 | 21 | 32 | 3 | 36 | 4 |
| *Mid-interior.* | | | | | | | | | |
| Georgetown | 30·02 | 89 | 58 | 96 | 8,22,23 | 45 | 13 | 0 | .. |
| Longreach | 30·08 | 83 | 54 | 93 | 21,25,26 | 39 | 11 | 0 | .. |
| Mitchell | 30·14 | 77 | 45 | 88 | 20, 26 | 29 | 3 | 4 | 1 |
| *Western.* | | | | | | | | | |
| Burketown | 30·03 | 85 | 60 | 95 | 22 | 48 | 5 | 0 | .. |
| Boulia | 30·09 | 84 | 55 | 97 | 20 | 40 | 3 | 0 | .. |
| Thargomindah | 30·13 | 77 | 52 | 94 | 20 | 39 | 4 | 93 | 3 |

## RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of September in the Agricultural Districts, together with Total Rainfall during 1929, and 1928, for Comparison.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Sept. | No. of Years' Records. | Sept., 1929. | Sept., 1928. | | Sept. | No. of Years' Records. | Sept., 1929. | Sept., 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | In. | | In. | In. |
| Atherton | 0·68 | 28 | 0·19 | 0 | Nambour | 2·63 | 33 | 0·33 | 0·42 |
| Cairns | 1·71 | 47 | 0·96 | 0·10 | Nanango | 1·84 | 47 | 0·17 | 0·09 |
| Cardwell | 1·57 | 57 | 0·51 | 0 | Rockhampton | 1·36 | 42 | 0·03 | 0 |
| Cooktown | 0·60 | 53 | 0·26 | 0·16 | Woodford | 2·25 | 42 | 0·20 | 0·60 |
| Herberton | 0·50 | 42 | 0·28 | 0 | | | | | |
| Ingham | 1·55 | 37 | 0·39 | 0 | | | | | |
| Innisfail | 3·64 | 48 | 1·81 | 0·02 | | | | | |
| Mossman | 1·54 | 16 | 0·76 | 0·11 | *Darling Downs.* | | | | |
| Townsville | 0·85 | 58 | 0·17 | 0 | | | | | |
| | | | | | Dalby | 1·72 | 59 | 0·08 | 0·15 |
| | | | | | Emu Vale | 1·79 | 33 | 0·28 | 0 |
| *Central Coast.* | | | | | Jimbour | 1·54 | 41 | 0·15 | 0·02 |
| | | | | | Miles | 1·40 | 44 | 0·11 | 0·03 |
| Ayr | 1·51 | 42 | 0·20 | 0 | Stanthorpe | 2·33 | 56 | 0·82 | 0·36 |
| Bowen | 0·86 | 58 | 0 | 0 | Toowoomba | 2·18 | 57 | 0·36 | 0·26 |
| Charters Towers | 0·78 | 47 | 0·10 | 0 | Warwick | 1·83 | 64 | 0·34 | 0·02 |
| Mackay | 1·64 | 58 | 0·24 | 0 | | | | | |
| Proserpine | 2·26 | 26 | 0·18 | 0 | | | | | |
| St. Lawrence | 1·29 | 58 | 0 | 0 | *Maranoa.* | | | | |
| | | | | | Roma | 1·49 | 55 | 0·01 | 0 |
| *South Coast.* | | | | | | | | | |
| Biggenden | 1·59 | 30 | 0 | 0·29 | | | | | |
| Bundaberg | 1·68 | 46 | 0·18 | 0·15 | *State Farms, &c.* | | | | |
| Brisbane | 2·01 | 78 | 0·48 | 0·78 | | | | | |
| Caboolture | 1·91 | 42 | 0·36 | 0·20 | Bungeworgorai | 1·09 | 15 | 0·02 | 0 |
| Childers | 1·86 | 34 | 0·11 | 0·57 | Gatton College | 1·60 | 30 | 0·20 | 0·14 |
| Crohamhurst | 2·70 | 36 | 0·35 | 0·25 | Gindie | 1·07 | 30 | 0 | 0 |
| Esk | 2·20 | 42 | 0·45 | 0·82 | Hermitage | 1·54 | 23 | 0·24 | 0 |
| Gayndah | 1·58 | 58 | 0·08 | 0·19 | Kairi | 0·67 | 15 | 0·45 | 0 |
| Gympie | 2·14 | 59 | 0·12 | 0·24 | Mackay Sugar Experiment Station | 1·58 | 32 | 0·02 | 0 |
| Kilkivan | 1·75 | 50 | 0 | 1·21 | Warren | 0·89 | 14 | .. | .. |
| Maryborough | 1·96 | 57 | 0·36 | 0·41 | | | | | |

GEORGE G. BOND, Divisional Meteorologist

# PARALYSIS OF THE HINDQUARTERS IN PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

*The disease described by Mr. Shelton in the following notes is often called erroneously Staggers or Rickets, while other terms used to indicate a similar condition are Down in the Back, Kidney Worms, or Paralysis.*

*The ailment is largely a "deficiency" disease, one almost entirely due to an insufficient supply of mineral matters (bone-making materials) in the food and to lack of green food. It is obviously a subject that must be handled more along the lines of prevention than actual treatment; one coming within the ambit of the instructor more than the inspector, and one that must be remedied more by an all-round improvement in the system of breeding, feeding, and handling than by the administration of medicine. Mr. Shelton's observations on the subject are therefore of unusual interest. These notes appeared originally in the Journal for November, 1927, and in response to numerous requests for information on the subject they are now reprinted with the approval of Major A. H. Cory, M.R.C.V.S., Chief Inspector of Stock.—Ed.*

Numerous inquiries reach the Department annually as to the cause and treatment of this all too common and very peculiar disease, if such it might be called. The subject has been dealt with previously in this Journal as well as in pamphlet form, but as both leaflet and pamphlet are now out of print, and as the trouble is of such an important nature, it warrants revision and repetition—this especially as further evidence of a very helpful nature has lately been received through official channels and from correspondence overseas.

A great deal has been written regarding "Paralysis of the Hindquarters in Pigs" and much research work has been carried out, principally with a view to ascertaining the exact nature of the conditions under which the disease occurs, and in studying the subject it is of interest to know just what other authorities are doing, and to determine whether or not their findings are applicable to our conditions in Queensland.

The disease is very largely one due to a deficiency of mineral matters in the food and to malnutrition, hence the writer's objective is to suggest how by improved methods of feeding and caring for pigs these abnormal conditions can be overcome. The Veterinary Officers of this Department should be consulted on all matters relating to medicinal treatment; their advice is also always available in case of any outbreak of disease no matter whether it be of a minor or of a more serious nature.

Paralysis of the hindquarters in pigs is, unfortunately, a trouble not confined to young pigs only, nor is it localised in Queensland. It appears to be a source of considerable trouble wherever pigs are kept the world over, though where the conditions under which pigs are kept are favourable to early maturity and to the healthy and rapid growth of all breeding stock, the disease has been kept in check and has caused but little trouble.

In referring to the occurrence of paralysis in pigs in this State and elsewhere, the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S., states that—

"The subject of paralysis in pigs has been given considerable attention for many years past.

"A small leaflet was issued some years ago to farmers dealing with what was then considered three principal causes of the complaint, but in recent years it has been ascertained that the paralysis, in many cases, is due to the lack of a vitamine known as Fat Soluble A, which is essential to the growth of animals, a deficiency leading to rickets.

"This vitamine is found in certain herbage, milk, cream, butter, eggs (yolk), beef fat, and cod liver oil. Latterly cod liver oil has been recommended to make up for the vitamine referred to, with, as far as can be ascertained, marked benefit.

"There is little to report regarding the incidence of the disease, as it occurs in any part of Queensland where pigs are improperly fed and not given the necessary attention. The same conditions exist all over the civilised world. It is mostly young growing pigs which are affected, and generally those in good condition.

"Apart from the paralysis, the pigs usually feed well and appear normal, the pathological changes taking place being apparently microscopical."

Professor L. A. Maynard, of the New York State College of Agriculture, Department of Animal Husbandry, has written on the following lines as a result of his experience:—

"This problem has been under investigation here for several years. On the basis of our studies, we believe the trouble is the result of improper mineral nutrition which prohibits a normal development of bone. This is due to a lack of calcium in most of our rations. We have shown that where paralysis occurs, the long bones are very deficient in calcium and phosphorus, and marked histological changes have occurred. These changes have been observed on a diet low in calcium. However, a lack of calcium is not the only factor involved, because the question of assimilation also comes in.

"Certain feeds are rich in the factor aiding mineral assimilation, and certain others are not. A ration which contains a certain amount of chopped alfalfa (green lucerne or lucerne chaff) is very useful for preventing paralysis, because it supplies the needed calcium and phosphorus and the factor aiding assimilation as well. We have shown, however, that there is a very beneficial effect from the adding of ground limestone and bone meal to rations which are now causing the trouble."

In a communication from Professor R. Adams-Dutcher, Head of the Department of Chemical Agriculture at the State College and Experiment Station, Pennsylvania, U.S.A., the following remarks appear:—

"I have the feeling from the knowledge that I have been able to obtain by reading, and in experimenting, that the diet is a very important factor in preventing paralysis in pigs, and probably calcium and phosphorus accompanied by proper vitamine-carrying foods are the most important dietary factors. Any number of animals have been relieved of the paralytic symptoms by feeding bone meals or other mineral mixtures carrying calcium and phosphorus; mixtures which carry calcium carbonate have also been effective. Veterinarians in New York have had fairly good success with wood ashes, but it is my recommendation that lime or bone meal be made available in those districts where hog paralysis is causing trouble. If lucerne or some other leafy green stuff or hay is available, this would also improve the situation, helping the animals to utilise this mineral matter to the best degree of efficiency."

The following extracts have been taken at random from mineographs supplied by Professor John M. Evvard, as a result of extensive experiment along the lines of feeding mineral mixtures, both simple and complex, to pigs not only with the idea of preventing paralysis, but of stimulating growth and enhancing the returns.

**Comment.**

(1) The feeding of minerals in whatever form allowed was quite advantageous in that the average daily gains were substantially increased, the length of the feeding period economically shortened, the feed required per 100 lb. gain considerably reduced, and the profits per pig enhanced.

(2) In feeding experiments the appetites of pigs for minerals is shown to be of considerable reliability, inasmuch as they clearly excelled check groups receiving no minerals.

(3) Although there appears to be some advantage gained from the feeding of a mineral mixture carrying more than the single emphasised ingredients, such as common salt, calcium carbonate, bone ingredients, and potassium iodide, yet just how far one can afford to go in the adding of other ingredients in practice is a matter for individual estimation and determination. Our experience has certainly indicated that some of the main ingredients necessary in the mineral mixtures are those that carry sodium and chlorine (common salt), calcium (lime, limestone, and bone materials), phosphorus (bone materials, rock, and other phosphates), and iodine (potassium or sodium iodide). The further addition of suitable combinations of such ingredients as common sulphur, a little charcoal, some Glauber's salts, as well as some other ingredients in small percentages or quantities has, on the whole, shown some benefits in our experimental work.

(4) It appears as if the farmer in his feeding of sulphur, charcoal, and other often-questioned materials has not gone entirely wrong, and like his well-founded belief in yellow corn (as against white corn), we should be sure of our grounds before declaring them or any of them non-beneficial.

(5) Our other work with minerals has shown the dollar and cents practicability of adding a good mixture of mineral ingredients to many ordinary pig rations.

(6) Our general recommendation is to provide a suitable mineral mixture for all classes and grades of pigs—the growing pigs, the breeding sow, the suckling pigs, the boars and all—and it is our suggestion that the mineral mixture be self-fed in an easily accessible place, well protected, and under shelter if possible.

(7) A good mineral mixture may be made up for practical everyday feeding as follows:—

> Common salt, 20 per cent.; finely ground raw bone meal, or steamed bone meal, or spent bone black, or rock phosphate, or acid phosphate, 40 per cent.; finely ground high calcium limestone, or wood ashes, or finely ground oyster shell, or lime thoroughly air slacked, 40 per cent. Total, 100 per cent.

If sulphur is desired, add approximately 10 lb. to the 100 lb. To every 100 lb. of the above minerals, add from ½ to 1 oz. of potassium iodide, mixing all ingredients thoroughly.

The following remarks upon this disease form the conclusions arrived at by Dr. J. W. Connaway, a prominent American veterinarian, who has been associated with many of the experiments relating to this particular trouble:—

Paralysis of the hindquarters in pigs may result from one of several causes, and the treatment will vary to some extent, according to the cause of the paralysis. The causes are—(1) Injuries; (2) impaction of the lower bowels; (3) kidney worms; (4) heavy suckling; and (5) lumbago or rheumatism. Each of these causes and the preventive and curative measures are discussed in order as follows:—

## Paralysis from Injuries.

If the pig has been running in the same yard with horses, mules, or cattle, it may have been kicked, pawed, horned, or trodden upon, and sustained an injury to the spine, legs, or muscles of the back or hips.

*Treatment.*—Make a thorough examination of these parts. Sometimes an injury is deep-seated and can be detected only by firm pressure and other manipulations of the paralysed parts which produce evidence of pain, fractures of bones, or rupture of tendons and muscular tissues; or the pressure of deep-seated abscesses. If the paralysis is due to an injury, the best treatment is absolute rest. Put the patient under shelter in a comfortable pen, where it can be bedded and kept quiet. Feed a light laxative diet and keep the pen and bedding clean. After a time, a stimulating liniment rubbed over the injured parts may hasten recovery. A mixture of equal parts of turpentine, ammonia, and cotton-seed oil makes a very good liniment. An abscess should be opened and be given proper antiseptic treatment.

## Paralysis from Impaction of the Bowels.

Paralysis of the hindquarters may result from an impaction of the lower bowels with hard masses of dung, causing excessive pressure upon the nerves and blood vessels in the pelvis or hip region. If the paralysed pig seems to be badly constipated, use rectal injections of warm water to soften and remove the hard lumps of dung. Add a couple of tablespoonsful of Glauber's salts to slops (food) and feed twice daily until the bowels are loose. Impaction is most frequently due to improper feeding, and to lack of tone of the bowels. A properly balanced ration with an adequate supply of water will prevent impaction of the bowels. In cold weather, pigs frequently do not have a proper supply of water. If the water is icy cold, pigs do not drink a sufficient quantity and are liable to become constipated. Some provision should be made for warming the water to take off the chill. A warm slop once a day will be helpful in keeping the bowels of the brood sow in good condition.

The following tonic will also be found useful:—Equal parts of pulverised copperas, Glauber's salts, Sal. soda, common salt, and a double portion of powdered charcoal, which should be thoroughly mixed and put in a covered trough (self-feeder), where all the pigs can have free access to it.

## Paralysis from Kidney Worms.

The so-called kidney (or lard) worms "Stephanurus dentatus" (also called "Selerostoma pinguicola") may cause paralysis of the hindquarters if these worms are present in large numbers in the sublumbar or loin region. These worms, in

the embryo stage, migrate into the fatty tissues around the kidneys, and sometimes into the kidneys and other organs, as the liver and pancreas. They produce inflammation, and at times abscesses, in the tissues where they lodge. As they are found in largest numbers in the kidney fat and loin region where the nerves are given off from the spinal cord to the hindquarters, the functions of the nerves of this region are more likely to be affected by these parasites and their toxic products.

*Treatment.*—A brisk rubbing or massage of the loin muscles, with an application of the liniment already mentioned to stimulate the nerves and increase the blood circulation of the affected region will be helpful. Turpentine should also be given internally; this will destroy many embryo worms in the intestines. As turpentine is very diffusible, it is believed to be useful in destroying these parasites in the tissues around the kidneys. To a 200-lb. pig give a tablespoonful of turpentine in half a pint of oil (cotton-seed or raw linseed); or warm milk may be substituted for oil. Shake well before using. Use a small necked bottle, drenching horn, drenching bit, or old leather shoe with a small hole cut out in the point, and give the drench slowly, or smaller doses may be added to the slop (food). The following worm remedy is also useful:—Santonin 6 grains, calomel 4 grains; this quantity to a bacon pig 100 lb. live weight or twice the amount to a pig weighing 200 lb. or more live weight.

In every case, the bowels should be completely emptied before the medicine is given. The Santonin (or Areca Nut may be used in similar quantities) and calomel should be mixed thoroughly with a small quantity of dry meal or shorts (pollard), which may then be moistened and fed alone, or the meal and medicine may be stirred into the feed or slop. Repeat the treatment in a few days.

As a preventive, use freshly slacked lime liberally over the pig yards to destroy worm embryos on the ground over which the pigs feed. Give the pig yards a thorough lining and clean up several times in the year.

### Paralysis from Heavy Suckling.

Brood sows that do not have a proper ration, or that are not able to utilise it effectively, sometimes go down in the hindquarters from suckling a big litter of rapidly-growing pigs. The rapid growth of the pigs requires considerable protein for muscle building and considerable bone-making material. All this must be supplied through the milk of the mother, and if the sow is not given the correct ration, her own muscles and bone tissues are depleted to supply proper elements for the growth of her pigs and the weakened condition mentioned results. This can usually be prevented by giving a food rich in protein and bone-making materials along with a corn ration. Protein supplements, such as "tankage" (meat or blood and bone meal), and linseed meal, should be provided. Protein may also be supplied by leguminous crops—clover, alfalfa (lucerne), cowpeas, and soy beans. Brood sows that have access to a feeding rack that is kept full of "pea green" lucerne or other legumes will have no trouble in supplying their pigs with both muscle and bone-forming materials, and will not be in much danger during their lactation period of going down in the hindquarters from too heavy a drain on their tissues. A little crushed wheat or corn and bran made into a slop with buttermilk is an excellent prescription, especially for sows that are low in condition from suckling large litters of pigs. Heat the milk nearly to boiling point for a few minutes before adding the grain constituent; this will prevent any possibility of transmitting tuberculosis or other diseases to the brood sows through cow's milk.

### Paralysis from Lumbago or Rheumatism.

A board off the pig pen may permit a cold draught to blow on the back of the pig at night. This chilling of the loins may produce lumbago, or temporary paralysis of the muscles of the hindquarters and inability to walk. Comfortable sleeping quarters prevent these troubles (as well as pneumonia, &c.). It is a mistaken notion that the thick layer of fat with which pigs are provided is sufficient protection against winter storms. On the contrary, pigs often suffer severely from cold and wet if not properly sheltered and properly bedded. If the pigs are affected with lumbago and rheumatism, clean out the bowels by means of a brisk purge (two to four tablespoonfuls of Glauber's or Epsom salts administered in a pint of warm water). Cut down the protein constituent of the ration; feed thin, warm slops to which baking soda is added in tablespoonful doses. Apply hot packs to the loin and paralysed limbs, massage the muscles and apply a stimulating liniment with brisk rubbing. Bed warmly and cover the body of the patient with a thick horse rug if the weather is cold.

## A Peculiar Ear Disease Possibly Mistaken for Paralysis.

Reference has also been made on several occasions in these columns to investigations that have recently been carried out by H. R. Seddon, D.V.Sc., and H. R. Carne, B.V.Sc. of the Veterinary Research Station, Glenfield, New South Wales (as reported in the "Agricultural Gazette" of New South Wales), these investigations having as their objective the determination of the cause and effect of a peculiar disease technically known as suppurative otitis affecting the ear of the pig; the principal symptoms of which are the abnormal carriage of the head and the interference with equilibrium and sense of direction. This disease—which, unfortunately, also is all too common in Queensland and is frequently mistaken for paralysis or as indicating the development of paralysis of the hindquarters—has been described by these veterinarians as follows:—

A condition has been noticed fairly commonly amongst young pigs in which the most prominent symptom is a peculiar alteration in the carriage of the head, which is accompanied frequently by unsteadiness of gait. The disease is seen usually in young pigs from a few weeks up to three or four months old. The reason for the relative infrequency of occurrence in older pigs is possibly that young pigs are more prone to catarrh (which appears to be the forerunner of the condition) and that affected animals suffer such loss of condition that they die or are killed as "runts" or "bad doers."

### Symptoms.

The most characteristic symptoms are the abnormal method of carriage of the head and the interference with equilibrium and sense of direction. The head is twisted or rotated to one side or the other so that one ear (the affected one) is depressed, such depression becoming more marked as the condition advances. It is noticed that the animal, when walking about, tends to circle in one direction, this being towards the side to which the head is depressed. For example, if the left ear is affected, the head will be rotated to the left with depression of the left ear and "circling" will occur in the same direction. At times this tendency to circle is not apparent, but it is noticed that when moving, the animal does so with an awkward gait, whilst the head is moved from side to side in an unbalanced manner. Affected animals may also exhibit considerable difficulty in going straight up to the feeding trough, having to make several attempts before gauging the right direction, sometimes walking to one side of the trough and sometimes to the other. It has frequently been noticed that the condition is accompanied by discharge from the nostrils and eyes.

In advanced cases there are very apparent disorders of equilibrium, the gait becoming unsteady and somewhat inco-ordinated, and the animals may fall into the feed trough and be unable to get out again.

Affected pigs are usually found to be "poor doers" showing a scurfy condition of the skin, lack of lustre of the hair, and poor condition. The appetite is capricious. In some cases examination of the affected ear reveals a considerable amount of yellowish brown or brown sticky discharge adhering to the inner surface of the ear.

### Cause and Lesions.

Examination of several pigs showing such symptoms has revealed the presence of a suppurative condition affecting the middle ear, and this may be the only demonstrable pathological change found on post-mortem examination.

The hearing apparatus, it may be mentioned, consists essentially of three parts:—

(1) The external ear, which is that portion visible externally. Its function is to collect sound waves and transmit them by means of a passage to—

(2) The middle ear: This is separated from the external ear by the tympanic membrane or "ear-drum." The function of the middle ear is to magnify the sound waves collected by the external ear and transmit them to—

(3) The internal ear: This consists of an intricate structure by which the sound impressions are transmitted to the sensory areas of the brain. The internal ear, however, performs another very important function—namely, the maintenance of equilibrium, it being by means of part of this structure that an animal keeps its balance. Disease of these deeper structures of the ear, therefore, frequently leads to an unsteady gait, twisting of the head to one side, or even to inability to stand at all.

Both the middle and internal ears are situated within the petrous-temporal bone of the skull and it is within this bone that the lesions responsible for the condition are found. The petrous-temporal bones are placed immediately behind the articulations of the lower jaws and the skull, but a careful dissection by sawing open the skull along the longitudinal mid-line and removal of the brain is necessary to expose them properly.

In several cases so examined, it has been found that a thick, cheesy material is present in the cavities of the bulbous portion (*bulla ossea*) of the middle ear on that side to which the head has been depressed during life. Normally, these cavities in the bone have a honeycombed appearance, consisting as they do of small, empty spaces separated by thin plates of bone.

The accumulated pus in the middle ear tends to burst through the ear drum and discharge externally, giving rise to the sticky discharge which may, in advanced cases, be seen on examination of the passage in the external ear.

Examination of the pus shows the presence of bacteria, such as are commonly met with in other suppurative conditions in the pig. It is probable that in these cases they gain entrance to the deeper structures of the ear by way of a narrower passage (called the Eustachian tube) which leads from the back of the throat to the middle ear, and from the comparative frequence of nasal catarrh in young pigs, it is probable that this ear disease is an extension of this inflammatory process affecting the lining membrane of the nasal passages.

### Prevention and Treatment.

Once the condition is established, it is unlikely that any treatment will be of use. Syringing of the outer ear will remove the obvious discharge, but will not penetrate into the deeper structures from which the pus arises. While the discharge cannot be definitely prevented, all possible means, such as proper attention to cleanliness and housing, should be undertaken in order that chills may be avoided. Diet should also be attended to, as it is found that this also plays a not unimportant part in the causation of those diseases, such as catarrh (snuffles) and pneumonia with which the condition is frequently associated.

### More Efficient Feeding Necessary.

As will be noted from the remarks of the authorities referred to above, both in regard to the condition, paralysis of the hindquarters, and to that more recently described by Doctors Seddons and Carne, it is apparent that any form of treatment must be preceded by a general clean-up of all the piggery buildings, yards, paddocks, &c., careful attention to breeding, and to the selection of reliable, healthy strains of pigs with which to stock up farm piggeries, to a more efficient system of feeding pigs, and to the use of mineral matters in the food given to pigs of all ages. It will be noted that special emphasis has been given throughout to the consistent use of liberal supplies of green food, lucerne, rape and barley, corn, pumpkins and melons, sweet potatoes and other root crops, grasses, and to any other green foods available on the farm.

### Mineral Mixtures.

The preparation and use of mineral mixtures is especially worth attention, for they will be found of great value in all seasons whether the supply of green food is available or not. In this connection the following recipes are suggested as being suited for use on all pig farms; the ingredients are reasonable in price, and are not difficult to obtain, and it should not be difficult for any farmer to arrange for a supply of these very necessary additions to the pigs' diet.

Mix together—Charcoal, 20 lb.; hardwood ashes, 20 lb.; coarse salt, 8 lb.; air-slaked lime, 4 lb.; flour of sulphur, 4 lb.; powdered copperas (sulphate of iron), 2 lb.

Prepare as follows:—First mix the lime, salt, and sulphur thoroughly, then add the charcoal and ashes. Dissolve the copperas in two pints of hot water and sprinkle over the whole mass, mixing thoroughly.

Keep some of this mixture before the pigs at all times in a strong box securely fastened in a weather-proof corner of the sty. Provide ample clean cold water at all times.

Lime water should be added to the morning feed, using half a pint to each two gallons of food. It will also pay to add a few ounces of sterilised bone meal to the food of the growing pig. This meal can be ordered specially for this purpose from any of the leading dealers in artificial fertilisers or from firms like Messrs. Thos. Borthwick and Sons (Australasia) Ltd., Wharf street, Brisbane, who also manufacture meat meal—a protein supplement of much value, and Bonolik, a mineral mixture. It may seem that these condiments are expensive and unnecessary, but in actual practice they will give a handsome return on the outlay, though it might be difficult to demonstrate this in actual pounds, shillings, and pence.

The provision of these mineral mixtures will satisfy the pig's desire for mineral substances and will prove of added value as a tonic and appetiser. Salt licks, Vita licks, &c., also are now available on the market, and are becoming increasingly popular each year.

Minerals are just as important in the growth and development of the pigs as are proteins, carbohydrates, fats, vitamines, ash, water, and other nutrients, and more attention should be given to their provision, because, as a rule, insufficient quantities are present in the ration.

All pig rations, of course, contain some minerals, but there are practically no pig rations, unless specially prepared, that contain an adequate quantity to meet the requirements of the pig's body. Pigs need minerals for the building up of bone, for making muscle, for cell division, and for carrying on of innumerable physiological functions.

Without minerals, growth and development will be restricted, and the pigs will be less profitable. Many pigs suffer because they receive inadequate quantities of minerals, but no pigs suffer because too large quantities are given to them. Consequently, we should see that our growing pigs have access at all times to a good mineral ration balancer.

### Corn Cob Charcoal.

A good use for the corn cobs (cores) that have always been allowed to accumulate on most farms and around piggeries is to make charcoal of them. The cores in themselves do not make a good feed for pigs because of their high and coarse fibre content, and even if the whole cob (corn and core as well) is ground, it has yet to be proved that there is an added value in them. The core is practically indigestible fibre that only burdens the pig's digestive organisation and causes indigestion.

After the pigs have taken all the corn from the cob, however, the waste cores can be raked together into a pile and burned to the point when it is all a live mass of coals. Water should then be sprinkled over the pile to put the fire out, and the partially charred cores gathered up for the pigs. If there are any other "chips" available, or any old corn husks, these should also be gathered and burned, and added to the charcoal made from the cores.

Some of the farmers in the "Rivers" district of New South Wales have for years followed this practice, and in these days when suction gas plants are in use to such an extent, quite a large trade has sprung up for the charcoal burner. In this case large pits are dug in the ground and suitable lengths of logs are pulled into these; they are then fired, and after a time are covered with earth. In a few days' time a good class of charcoal results. These farmers have been making good money, and, at the same time, clearing their holdings.

It pays also to burn all old bones, waste timber, &c., and thus convert these into a form of charcoal.

### Provide More Water.

The water supply should have special attention, for certain it is that many pigs do not have a sufficient supply of clean drinking water, and, as a general rule, pigs from a few days old upwards will be found to appreciate liberal supplies; it is surprising how much water a pig a month old will drink if he has the opportunity of securing a supply.

### Careful Handling in Transit.

Many pigs are handled so roughly in transit to market that they arrive at the markets, factories, &c., down in the back or otherwise disabled.

The writer has seen hundreds of cases like this in which the animals have been unable to walk from the railway trucks. The industry suffers heavy losses each year as a result. It should be the duty of every farmer to see that not only his own, but that all other animals in transit to market are handled carefully, and that no undue haste is made in rushing the animals into the trucks or other means of conveyance.

### The Condition of the Breeding Sow.

Reference has been made above to the fact that frequently breeding sows suffer from paralysis of the hindquarters as a result of loss of vitality and condition from suckling a large litter of active, vigorous pigs. In this regard it is necesary that the breeder should know the correct condition in which to maintain his breeding sows.

Figures shown represent sows that are too low in condition to farrow and rear their litters successfully. These sows would, in all probability, suffer severely as a result, and their progeny could not be regarded as having the same chance as the progeny of the sows illustrated which represents the normal condition of breeding sows, the condition in which a sow should be maintained for best results; sows that are too fat are likely to have trouble at farrowing time, and their progeny will frequently prove to be weak, puny, and unable to battle for themselves.

The importance of diet and the necessity for careful attention to all details of management are strikingly illustrated in the plate from Henry and Morrison's latest book on "Feeds and Feeding."

### Overfeeding Young Pigs on Corn—A Cause of Paralysis of the Hindquarters.

The importance of properly balanced rations cannot be too strongly stressed. Many bacon pigs suffer from paralysis of the hindquarters as a result of being overfed on a ration consisting almost exclusively of corn and water or even of corn and milk; in fact, many authorities condemn the use of corn as a food for young pigs, but the writer's experience demonstrates that, provided corn is fed in comparatively small quantities during the early stages and is well balanced up with liberal supplies of milk, green stuff, &c., that it can be fed to very considerable advantage to all classes of pigs. In these days there is no demand for heavy fat bacon, hence there is no profit in over-feeding pigs on expensive grains, though some grain is necessary, especially in the case of young growing pigs.

### Departmental Suggestions.

Paralysis in pigs is brought about by several causes in addition to the other causes referred to above—viz., deficiency of vitamines, &c. In these cases the following lines of treatment are suggested:—

### Treatment.

If due to rheumatism, see that the pigs are housed at night in a dry place, and allowed to sleep on wood flooring instead of on concrete or earth. Give daily salicylate of soda 15 to 30 grains, and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms give, in the food or as a drench, 1 teaspoonful of oil of turpentine, 20 drops of perchloride of iron, and 3 or 4 oz. of raw linseed oil. This is sufficient for 50 lb. body weight.

It should be given after the animal has been fasting for some hours, and can be repeated several times, with an interval of three or four days. When due to feeding, as mentioned above, stop the corn and give once daily in a mixed diet or in milk 1 dessertspoonful of the following powder for every 100 lb. body weight (after it has been well mixed and powdered):—Sulphur 2 oz., sodium bicarbonate 4 oz., sodium sulphate 2 oz., black antimony 2 oz., sulphate of iron 1 oz., wood charcoal 2 oz.

A useful mineral mixture well worth trial also is made up as follows:—Add 1 dessertspoonful of the following mixture to the food of each pig daily:—Sulphate of iron, 1 part; sulphur, 2 parts; sterilised bone meal, 10 parts. Very young pigs should receive about half these doses. The following excerpt is also of interest in studying this peculiar disease—paralysis of the hindquarters.

### Causes.

When asked why pigs go down behind and suffer from a form of paralysis, Dr. K. W. Stouder, an Extension Service Specialist at the Iowa State College, U.S.A., said—

Weakness of the legs and back to such an extent that the animal is unable to stand is commonly seen among pigs. It is seen more often in recent years, perhaps, than it was some years ago.

We must not assume that it is all caused by the same thing, nor that all cases are exactly alike. In fact, they can easily be divided into at least two groups, the old sow that goes down and the growing store pig. Most sows go down after suckling a vigorous litter of pigs, and such cases are usually due to a lack of enough minerals, proteins, and vitamines in the rations to support the litter she raises and to provide for her own body-maintenance needs as well.

Many of these cases recover as the experienced feeder knows, if the patient is put on a ration of whole cow's milk every day, as it supplies the deficiencies, but it is more important to remember that this type of going down behind would not have occurred had the food ration been well balanced during the gestation period and while she was suckling her litter.

Young pigs may also go down because of the unbalanced rations, particularly it seems if the ration is low in mineral content and of the vitamines so essential to good health. It may also result from generations of breeding and selection, together with forced feeding for early maturity, rapid gains and excessive fat production, disregarding constitution, good bony framework and vigour. Cases of this kind are common, we believe, and they strongly indicate why these animals and their close relatives should be discarded as breeding animals to perpetuate the herd, for in such cases predisposition has much to do with its occurrence. Its occurrence one generation after another in certain families can thus be accounted for in part at least.

Some animals that go down show deficiency of bone; some show degeneration of nerves that control the muscles of the back and legs; others are found to suffer disease of the bony surfaces that come together at a joint, particularly where the thigh bone attaches to the body. These lastnamed cases of diseased joints may be the result of navel infection during the first few days after birth and could have been avoided had the pig been farrowed in a very clean place and kept under the cleanest surroundings, together with iodine or other antiseptic treatment of the navel until it dried up.

### Difficulty of Diagnosis.

The treatment of these cases gives variable results, perhaps depending first upon the difficulty of diagnosing with certainty the exact trouble in each case presented for treatment. Some cases improve on a mineral mixture, especially if given calcium phosphate, and others do better on spoonful doses each day of cod liver oil because the latter is rich in vitamines.

It is suggested that breeding animals and growing animals be given well balanced rations, so far as providing plenty of protein is concerned in relation to the fattening foods; that minerals be kept available and a mixture of equal parts of air-slacked lime, salt, and bone meal by weight serves as good as any.

### Preventive Measures.

When young pigs are born, apply tincture of iodine to the navel daily until it is dry. Don't keep even the relatives of the pigs that show this trouble for breeding purposes. When it occurs, give whole milk, cod liver oil, calcium phosphate, and carrots, if you have them available, in addition to a well-balanced ration, and some cases will recover, but there are those that never get up though appetite and general health otherwise seem good.

There are cases, of course, in which the ailment is due to accident. The treatment for these cases must be on common-sense lines, and must aim at keeping the animal in good heart and in otherwise healthy condition. There are other cases in which intestinal worms, and possibly kidney worms, are the direct or the indirect causes; these cases must receive a course of treatment that will tend to clear them of the parasites and put them in a condition to battle against future infestation.

Another American authority has this to say on the subject:—

"Professor L. A. Weaver, Swine Specialist of the Missouri (U.S.A.) Agricultural College, states that the two minerals most frequently lacking in the food for pigs are calcium and phosphorus. Experiments have shown that pigs are able to use these minerals when supplied either in an organic or inorganic form. In other words, ground limestone, which is calcium or lime phosphate, serves as well as a source of phosphorous as does wheat bran, where the phosphorus is in an organic form. Calcium may be satisfactorily furnished in almost any form, such as lime, ground limestone, or bone meal."

Included among suggested remedies by other authorities as well as by our own experience in handling animals in a paralysed condition are as follows:—

Where animals have the benefit of a grazing area, it would be an advantage, if possible, to subdivide this, allowing them to use only one portion at a time, the other portion resting and sweetening up meantime. Where the ground is at all swampy or low lying, some endeavour should be made to drain the area. It is on these low lying, swampy areas where infection from kidney worms or from intestinal worms would be suggested—hence the advisability of changing the pigs from one pasture to another frequently. Pigs infested with kidney worms, however, seldom recover normal condition, though they may appear perfectly healthy and have good appetites. There is, unfortunately, no external indication of the infestation unless paralysis be accepted as a definite symptom.

### Results of Experiments.

A series of experiments carried out at one of the Agricultural Colleges in England demonstrated that pigs fed on an exclusive corn diet have a weaker bone than those having a better balanced ration. If, therefore, animals are receiving corn alone, other foods, especially skimmed milk and green foods (with minerals), should be added to make up the deficiency.

Within the last year or two, a very extensive investigation overseas regarding this disease, has demonstrated among other things that pigs affected with paralysis of the limbs have a broken down condition of the nerves that supply the muscles of the hind limbs with innervation. While it is possible that this is not always the case, still it was found in a large percentage of the patients examined, and as degenerated or broken down nerves cannot be restored to their full function, we are forced to come to the conclusion that paralysis of the hind parts of the pig is, in many cases, incurable. The cause of this breaking down of the nerves is not known, and, therefore, intelligent curative treatment cannot be recommended. Preventive treatment is always somewhat vague, but it is always well to separate the diseased from the healthy pigs, to disinfect all pens by spraying them or by the application by hand of limewash, and by avoiding the use of affected pigs or pigs closely related to them for breeding purposes, as there is some danger that there may be a hereditary predisposition to the disease.

In cases due to accident or injuries, common-sense methods must, of course, be employed in treatment. Meanwhile, the animal requires careful housing and a course of medicinal treatment to keep the bowels and bladder free. The food should be of a soft, nourishing nature. Allow water and green food also.

The use of cod liver oil appears to have the general recommendation of a number of investigators handling paralysed pigs. This oil given at the rate of one teaspoonful per pig (from 6 months old upwards) daily mixed in the food is suggested.

Another remedy recently suggested in dealing with the disease, as one due to a deficiency of mineral matters and to a lack of vitamines, indicates that something needed for nutrition is absent in the foods in use for the affected pigs. The Colorado Agricultural College authorities in answering an inquiry on these lines recently give this advice—"That as the foods being fed to the animals under review had on analyses shown a deficiency of minerals, and were particularly deficient in vitamine B., it was recommended to try feeding the pigs on a ration consisting of plenty of milk and carrots, using new milk for a start and skimmed milk later. Results under experimental work with this ration in case of pig paralysis have been remarkable.

### An Incurable Form.

Paralysis resulting from tuberculous bones is incurable, and as the carcases would not be fit for human consumption the sooner they are destroyed the better. It is, of course, possible to test pigs with the tuberculin test, though this is not a very satisfactory business with pigs for the reason that it must be carried out by a competent veterinarian and the expense incurred would hardly be justified except in the case of very valuable stud pigs.

If there is any conclusive evidence that the animal is tubercular, he had better be destroyed immediately and be burned to ashes on the spot on which he is killed.

In addition to paralysis resulting from tuberculous bones, any abnormal condition affecting the spinal cord, such as abscesses, tumours, parasites, or even diseased and softened bones may be a primary cause for the trouble. Paralysis immediately following farrowing is, in our experience, not common, but it may result from a weakened condition of the animal and in cases of this description the preventive measures indicated should be adopted, as also in cases attributed to lumbago and rheumatism.

### Early Signs of the Trouble.

As a rule, paralysis comes on gradually, being indicated in the first instance by a wobbly, uncertain gait, the animal failing to control its movements, particularly if hurried or if the animal is turning around. Walking gradually becomes more difficult as the weakening of the nerves and muscles of the hindquarters progresses, but in almost every instance the appetite and general health of the animal is not affected, hence any abnormal change in the appetite or any other indication of sickness must be looked to as premonitory of other and perhaps more serious troubles. Constipation must be relieved by repeated doses of Epsom salts or castor or linseed oils. Massaging of the affected muscles and the application of liniments as referred to above are suggested.

Finally it is suggested that in every instance where the trouble appears in more than one animal, or where it apppears that ordinary care and attention is ineffective in bringing about the desired result, the services of a qualified veterinary surgeon should be requisitioned to take complete charge of the case.

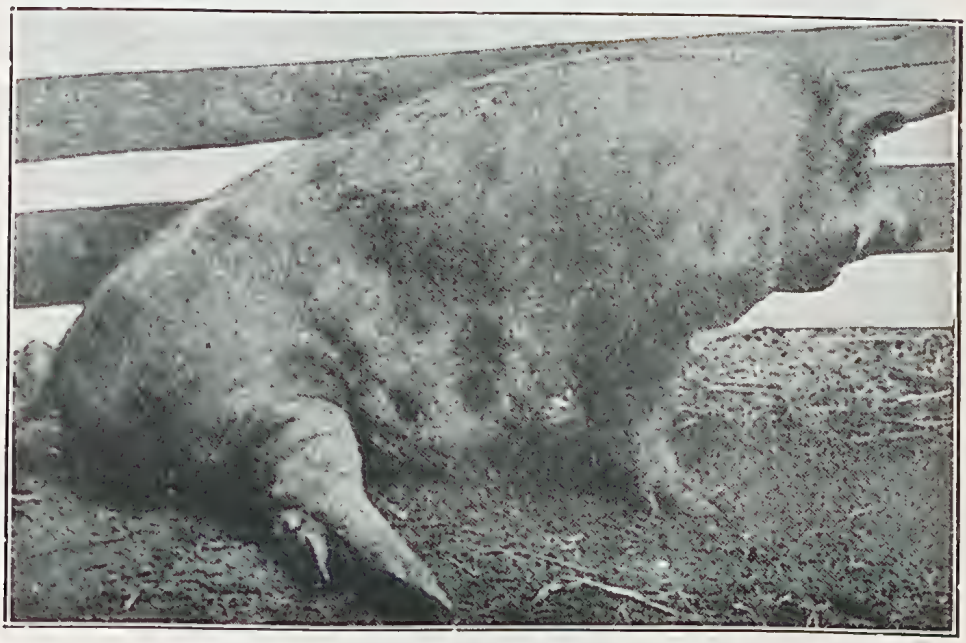

PLATE 171 (Fig. 1).

A typical case of Paralysis of the Hindquarters. It will be noted that although paralysed in the hindquarters to the extent that she cannot raise her hind legs or use them in any other way the animal has not lost condition. Strangely enough, the appetite is not usually affected provided the animal is otherwise normal.

PLATE 172 (Fig. 2).

These pigs are suffering from a very severe attack of paralysis of the hindquarters. The pig on the right is still able to move about but with great difficulty and a very uncertain gait, but as is the case with the other two is quite unable to control its movements. The photograph is of pigs fed on a ration containing a very low mineral content. Stiffness and partial loss of control followed after about six weeks' feeding. In the same experiment a second lot fed the same ration plus five times as much calcium phosphate as lot No. 1 had gained 89 per cent. more weight and were not affected with paralysis. Both lots were afterwards slaughtered. The skeletons of the pigs illustrated in Fig. 2 weighed 1,193 grams. That of the pigs fed in separate pen and which were given sufficient calcium phosphate weighed 2,371 grams, or 100 per cent. more.

PLATE 173 (Fig. 3).

Symptoms of posterior paralysis (breaking down in the back).

PLATE 174 (Fig. 4).

Illustrating a pig that has been injured in transit and unable to travel. Many pigs arrive at our bacon factories and saleyards in such a condition, resulting in their market value being reduced probably 75 per cent. This emphasises the necessity of giving careful attention to the animals in every stage, particularly in transit.

Plate 175 (Fig. 5).—Pigs Suffering from Severe Cases of Rickets.

These pigs received a ration of white corn and skim milk, without pasture. Note the paralysed condition. The pig on the left died within a week after the photograph was taken, while the one on the right gradually recovered when cod liver oil was added to the ration.

(From Henry and Morrison's "Feeds and Feeding.")

These pigs are suffering from an advanced form of the disease Rickets, a similar condition to that referred to as paralysis of the hindquarters. The reference to this illustration emphasises the necessity of careful feeding and the provision of a liberal supply of mineral matters and vitamines in the food.

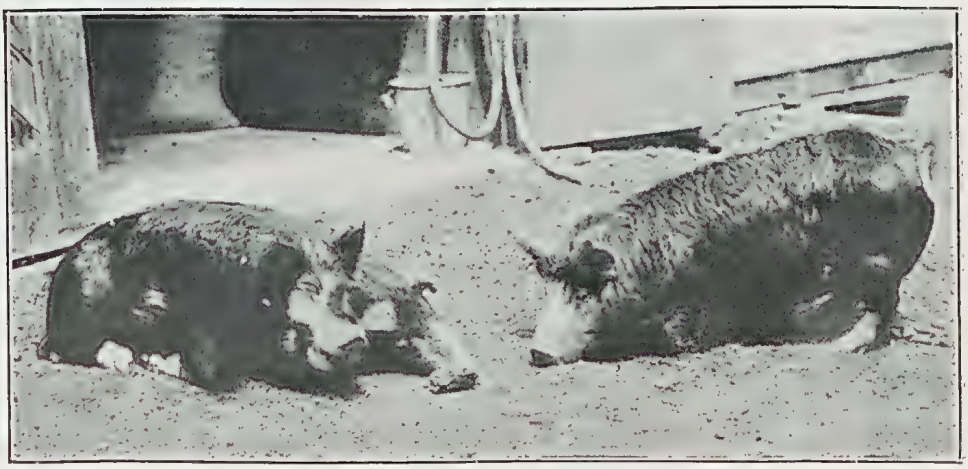

Plate 176 (Fig. 6).

These pigs were raised at the Wisconsin Station (U.S.A.) on grain and grain by-products, without pasture or any other food. They became stunted, and finally developed the severe paralysis depicted. The proteins in such a ration are unbalanced in composition; there is a deficiency of mineral matter, especially calcium; and there may be a lack of vitamines. (From Hart, Wisconsin Station, in Henry and Morrison's "Feeds and Feeding.")

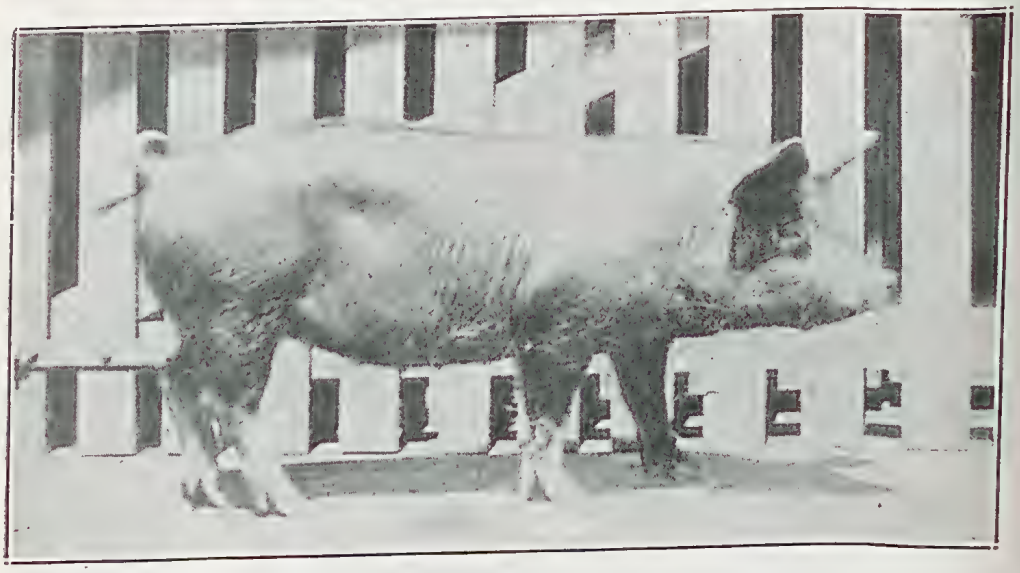

PLATE 177 (Fig. 7).

PLATE 178 (Fig. 8).

Figs. 7 and 8 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 7 is too low in condition to mate to the best advantage, while the sows shown in Fig. 8 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders, as their breeding is doubtful and there are plenty of better type sows available at prices compartively low.

Fig. 9 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from troubles such as heat apoplexy as well as paralysis. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers on the same steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening.

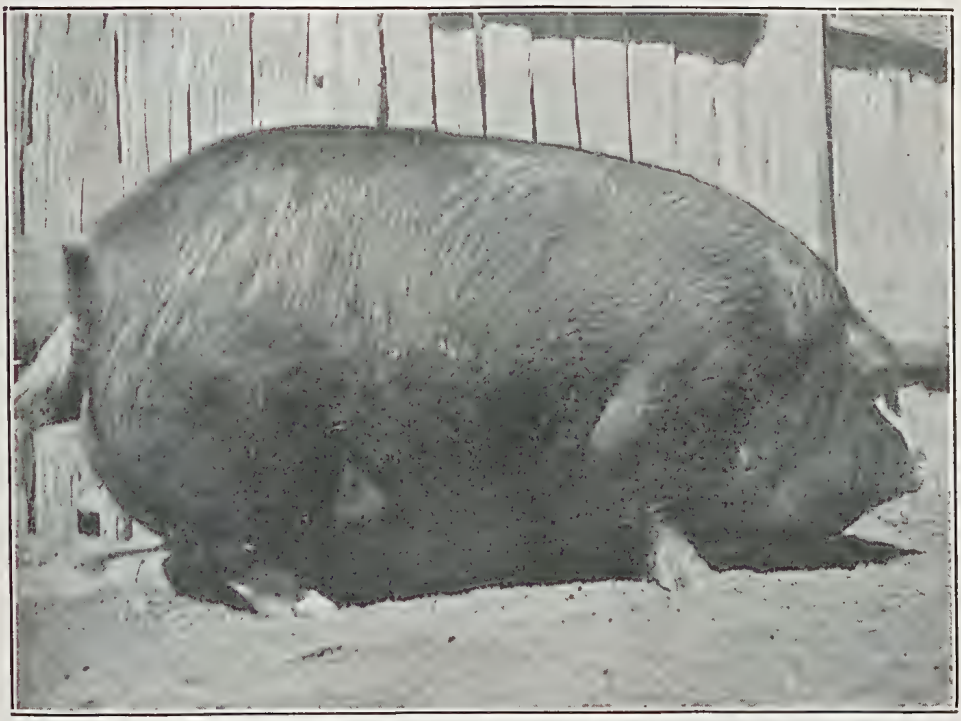

PLATE 179 (Fig. 9).

PLATE 180 (Fig. 10).

Fig. 10 is a prize-winning Gloucester Old Spot sow. This sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her pigs.

PLATE 181 (Fig. 11).—A GROUP OF SELECTED BERKSHIRE BROOD SOWS.

Sows of this description always realise good values in normal seasons, and are worth special care.

Fig. 11.—Berkshire sows in medium breeding condition, the condition conducive to satisfactory results. This is the ideal condition for in-pig sows, for they will farrow with little or no trouble and be able to rear their litters satisfactorily and without risk of going down in the hindquarters or suffering from other diseases.

## TICK PARALYSIS IN PIGS.

A correspondent informed us recently that he had a well-grown, three-months-old sow that had become suddenly very ill; she went off feed and lay down. On rolling her over, the owner found a whitish coloured tick (known as a dog tick), and he sought information as to suitable treatment for an animal so affected.

Another correspondent advised: "I have recently purchased three first-class Middle York sows, three months old. They were in perfect condition when they arrived here, and have been well fed and cared for since, but two days ago I noticed that two of them were suffering from some ailment or other; they would not come up for their food, were very stiff and 'dopey,' and appeared to be getting worse. I am at a loss to know what is wrong or what to do . . ."

The following information was supplied:—The fact that the ailment suddenly manifested itself in the pigs suggests that it may be attributable either to bush-tick poisoning or to severe constipation. The common bush-tick fastens itself on the animal, usually about the head, ears, neck, or under the foreleg, and the poisonous effect of its bite causes a temporary paralysis of the hindquarters (particularly) and frequently severe constipation. These ticks (*Ixode holocytus*) are comparatively common along the coastal districts of New South Wales and Queensland, and one species is found inland. They generally attack dogs, poultry, and pigs; but other animals are not by any means immune, nor even are human beings. After attaching itself to the animal the tick forces its feeding apparatus through the skin (it usually selects a thin-skinned portion of the body for its temporary abode) and commences to suck blood from the affected part. The tick gradually fills up, increases to two or three times its normal size, and at the same time apparently injects a certain amount of poison into the animal, the result being that the animal goes off its food, is disinclined to move from its bed, and when disturbed appears stiff, sickly, and paralysed, particularly in the hindquarters (later the forequarters may also be affected), breathing becomes laboured, and there may be a discharge from the nostrils; bowels are inactive and severe constipation follows; kidneys and bladder become inflamed and congested, and the urine is scanty and high coloured. If not attended to the animal gradually becomes worse, loses condition, and death occasionally results.

Careful search should be made for the ticks, and if found they should be cut off close to the skin with a sharp pair of scissors, or, better still, with a sharp razor. Do not attempt to pull the tick away. After cutting the tick off, rub the affected spot with antiseptic ointment, kerosene, or Stockholm tar.

Remove the pigs to a pen where they can be attended to regularly. Give each pig two tablespoonsful of castor oil in a half-cupful of warm milk as a drench immediately. About three hours after give each pig a mixture of one dessertspoonful of aromatic spirits of ammonia and ten drops of nux vomica (the chemist will make this up for you) in a small cupful of warm milk.

Compel the animals to take exercise; provide dry and warm, clean sleeping quarters, and treat the patients kindly for a few days. Give soft nourishing foods—milk, pollard, a bran mash, and similar foods.

Another remedy that has proved successful is as follows:—Give castor oil or olive oil as already advised, and an hour later give six drops of tincture of aconite each in a small quantity of warm water. Three hours later, if the patients have not recovered, give three drops of the same drug and repeat until four doses have been given; do not give more than four doses. Follow the instructions with regard to feeding and housing.

## PRECAUTIONS AGAINST SWINE FEVER.

The most potent factor in the spread of swine fever among pigs is undoubtedly the infected pig, which may even pass on the disease to others several days before symptoms are exhibited, says Major C. G. Saunders, in an interesting article in the current issue of the "Pig Breeders' Annual." It must also be remembered that this infectiousness remains during the whole course of this disease. The virus of the disease is also spread through the medium of urine, fœces, eye and nasal discharges; and the floors, bedding, and manure in the pens or sties where infected pigs are housed become saturated with the virus which may be carried from one farm to another, or to different parts of the same farm on the feet of men and animals, or on the wheels of vehicles, and probably by birds. Stock attendants may also, by medium of their hands and any instruments or tools they may use, be the means of spreading the disease far and wide. The chief danger is, however, the infected pig, and attention is specially drawn to the fact that unthrifty pigs may have swine fever without showing any definite symptoms of the disease, and may be moved from one farm to another under the impression that they many only be suffering from some non-contagious disease. Another danger is the pig that has apparently recovered from the disease but is, in reality, suffering from it in a very chronic form, as such pigs may be infective to others for eighty days or longer. Carcases of pigs which have died from swine fever may retain the virus for months, and even cured meats are not always safe in this respect. Hence the necessity of boiling all offal and garbage before feeding to pigs.

The following precautions will reduce the danger of an outbreak of swine fever:—

(1) Quarantine all newly purchased stock and all pigs returned from show or market for three weeks in a remote section of the farm, and admit to the main herd only after careful scrutiny has revealed nothing suspicious.
(2) Locate pig yards and sties away from streams, highways, and keep strangers away from them, and especially pig dealers and persons who have unthrifty pigs upon their premises.
(3) Buy only from herds that are known to be healthy.
(4) Do not visit a farm where there are sick or unthrifty pigs.
(5) Cook all swill and offal before feeding, and make the man that has handled the raw material disinfect himself immediately after.
(6) After an outbreak of swine fever see that all carcasses are burned or buried deeply with quicklime.

It is well to remark here that in Australia stock regulations compel pig breeders to immediately report to the nearest stock inspector, police officer, or other Government official any suspected outbreak or serious trouble amongst pigs, and to carry out the instructions issued by these officers so that there will be no possible chance of disease spreading from herd to herd. Heavy penalties are imposed upon those who neglect or fail to carry out instructions issued under the Acts controlling these diseases, and the premises concerned may be quarantined for whatever period is deemed necessary. There is everything to gain and nothing to lose by reporting the matter immediately it is suspected there is anything seriously wrong with the pigs. The Departments of Agriculture in the various States will supply all information relative to these matters upon application free of cost. In any case it would be very unwise to introduce other pigs into such premises that were suspected of being infected until the matter was cleared up and only healthy stock remained on the property, and all buildings and stys, yards, paddocks thoroughly cleansed and freed of infection.—E. J. Shelton, H.D.A., Senior Instructor in Pig Raising, and approved by the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S.

# GESTATION CHART FOR BREEDING SOWS.

| Jan. | Date of Farrowing. | Feb. | Date of Farrowing. | March. | Date of Farrowing. | April. | Date of Farrowing. | May. | Date of Farrowing. | June. | Date of Farrowing. | July. | Date of Farrowing | Aug. | Date of Farrowing. | Sept. | Date of Farrowing | Oct. | Date of Farrowing | Nov. | Date of Farrowing | Dec. | Date of Farrowing. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 22 April | 1 | 23 May | 1 | 20 June | 1 | 21 July | 1 | 20 Aug. | 1 | 20 Sept. | 1 | 20 Oct. | 1 | 20 Nov. | 1 | 21 Dec. | 1 | 20 Jan. | 1 | 20 Feb. | 1 | 22 Mar. |
| 2 | 23 ,, | 2 | 24 ,, | 2 | 21 ,, | 2 | 22 ,, | 2 | 21 ,, | 2 | 21 ,, | 2 | 21 ,, | 2 | 21 ,, | 2 | 22 ,, | 2 | 21 ,, | 2 | 21 ,, | 2 | 23 ,, |
| 3 | 24 ,, | 3 | 25 ,, | 3 | 22 ,, | 3 | 23 ,, | 3 | 22 ,, | 3 | 22 ,, | 3 | 22 ,, | 3 | 22 ,, | 3 | 23 ,, | 3 | 22 ,, | 3 | 22 ,, | 3 | 24 ,, |
| 4 | 25 ,, | 4 | 26 ,, | 4 | 23 ,, | 4 | 24 ,, | 4 | 23 ,, | 4 | 23 ,, | 4 | 23 ,, | 4 | 23 ,, | 4 | 24 ,, | 4 | 23 ,, | 4 | 23 ,, | 4 | 25 ,, |
| 5 | 26 ,, | 5 | 27 ,, | 5 | 24 ,, | 5 | 25 ,, | 5 | 24 ,, | 5 | 24 ,, | 5 | 24 ,, | 5 | 24 ,, | 5 | 25 ,, | 5 | 24 ,, | 5 | 24 ,, | 5 | 26 ,, |
| 6 | 27 ,, | 6 | 28 ,, | 6 | 25 ,, | 6 | 26 ,, | 6 | 25 ,, | 6 | 25 ,, | 6 | 25 ,, | 6 | 25 ,, | 6 | 26 ,, | 6 | 25 ,, | 6 | 25 ,, | 6 | 27 ,, |
| 7 | 28 ,, | 7 | 29 ,, | 7 | 26 ,, | 7 | 27 ,, | 7 | 26 ,, | 7 | 26 ,, | 7 | 26 ,, | 7 | 26 ,, | 7 | 27 ,, | 7 | 26 ,, | 7 | 26 ,, | 7 | 28 ,, |
| 8 | 29 ,, | 8 | 30 ,, | 8 | 27 ,, | 8 | 28 ,, | 8 | 27 ,, | 8 | 27 ,, | 8 | 27 ,, | 8 | 27 ,, | 8 | 28 ,, | 8 | 27 ,, | 8 | 27 ,, | 8 | 29 ,, |
| 9 | 30 ,, | 9 | 31 ,, | 9 | 28 ,, | 9 | 29 ,, | 9 | 28 ,, | 9 | 28 ,, | 9 | 28 ,, | 9 | 28 ,, | 9 | 29 ,, | 9 | 28 ,, | 9 | 28 ,, | 9 | 30 ,, |
| 10 | 1 May | 10 | 1 June | 10 | 29 ,, | 10 | 30 ,, | 10 | 29 ,, | 10 | 29 ,, | 10 | 29 ,, | 10 | 29 ,, | 10 | 30 ,, | 10 | 29 ,, | 10 | 1 Mar. | 10 | 31 ,, |
| 11 | 2 ,, | 11 | 2 ,, | 11 | 30 ,, | 11 | 31 ,, | 11 | 30 ,, | 11 | 30 ,, | 11 | 30 ,, | 11 | 30 ,, | 11 | 31 ,, | 11 | 30 ,, | 11 | 2 ,, | 11 | 1 April |
| 12 | 3 ,, | 12 | 3 ,, | 12 | 1 July | 12 | 1 Aug. | 12 | 31 ,, | 12 | 1 Oct. | 12 | 31 ,, | 12 | 1 Dec. | 12 | 1 Jan. | 12 | 31 ,, | 12 | 3 ,, | 12 | 2 ,, |
| 13 | 4 ,, | 13 | 4 ,, | 13 | 2 ,, | 13 | 2 ,, | 13 | 1 Sept. | 13 | 2 ,, | 13 | 1 Nov. | 13 | 2 ,, | 13 | 2 ,, | 13 | 1 Feb. | 13 | 4 ,, | 13 | 3 ,, |
| 14 | 5 ,, | 14 | 5 ,, | 14 | 3 ,, | 14 | 3 ,, | 14 | 2 ,, | 14 | 3 ,, | 14 | 2 ,, | 14 | 3 ,, | 14 | 3 ,, | 14 | 2 ,, | 14 | 5 ,, | 14 | 4 ,, |
| 15 | 6 ,, | 15 | 6 ,, | 15 | 4 ,, | 15 | 4 ,, | 15 | 3 ,, | 15 | 4 ,, | 15 | 3 ,, | 15 | 4 ,, | 15 | 4 ,, | 15 | 3 ,, | 15 | 6 ,, | 15 | 5 ,, |
| 16 | 7 ,, | 16 | 7 ,, | 16 | 5 ,, | 16 | 5 ,, | 16 | 4 ,, | 16 | 5 ,, | 16 | 4 ,, | 16 | 5 ,, | 16 | 5 ,, | 16 | 4 ,, | 16 | 7 ,, | 16 | 6 ,, |
| 17 | 8 ,, | 17 | 8 ,, | 17 | 6 ,, | 17 | 6 ,, | 17 | 5 ,, | 17 | 6 ,, | 17 | 5 ,, | 17 | 6 ,, | 17 | 6 ,, | 17 | 5 ,, | 17 | 8 ,, | 17 | 7 ,, |
| 18 | 9 ,, | 18 | 9 ,, | 18 | 7 ,, | 18 | 7 ,, | 18 | 6 ,, | 18 | 7 ,, | 18 | 6 ,, | 18 | 7 ,, | 18 | 7 ,, | 18 | 6 ,, | 18 | 9 ,, | 18 | 8 ,, |
| 19 | 10 ,, | 19 | 10 ,, | 19 | 8 ,, | 19 | 8 ,, | 19 | 7 ,, | 19 | 8 ,, | 19 | 7 ,, | 19 | 8 ,, | 19 | 8 ,, | 19 | 7 ,, | 19 | 10 ,, | 19 | 9 ,, |
| 20 | 11 ,, | 20 | 11 ,, | 20 | 9 ,, | 20 | 9 ,, | 20 | 8 ,, | 20 | 9 ,, | 20 | 8 ,, | 20 | 9 ,, | 20 | 9 ,, | 20 | 8 ,, | 20 | 11 ,, | 20 | 10 ,, |
| 21 | 12 ,, | 21 | 12 ,, | 21 | 10 ,, | 21 | 10 ,, | 21 | 9 ,, | 21 | 10 ,, | 21 | 9 ,, | 21 | 10 ,, | 21 | 10 ,, | 21 | 9 ,, | 21 | 12 ,, | 21 | 11 ,, |
| 22 | 13 ,, | 22 | 13 ,, | 22 | 11 ,, | 22 | 11 ,, | 22 | 10 ,, | 22 | 11 ,, | 22 | 10 ,, | 22 | 11 ,, | 22 | 11 ,, | 22 | 10 ,, | 22 | 13 ,, | 22 | 12 ,, |
| 23 | 14 ,, | 23 | 14 ,, | 23 | 12 ,, | 23 | 12 ,, | 23 | 11 ,, | 23 | 12 ,, | 23 | 11 ,, | 23 | 12 ,, | 23 | 12 ,, | 23 | 11 ,, | 23 | 14 ,, | 23 | 13 ,, |
| 24 | 15 ,, | 24 | 15 ,, | 24 | 13 ,, | 24 | 13 ,, | 24 | 12 ,, | 24 | 13 ,, | 24 | 12 ,, | 24 | 13 ,, | 24 | 13 ,, | 24 | 12 ,, | 24 | 15 ,, | 24 | 14 ,, |
| 25 | 16 ,, | 25 | 16 ,, | 25 | 14 ,, | 25 | 14 ,, | 25 | 13 ,, | 25 | 14 ,, | 25 | 13 ,, | 25 | 14 ,, | 25 | 14 ,, | 25 | 13 ,, | 25 | 16 ,, | 25 | 15 ,, |
| 26 | 17 ,, | 26 | 17 ,, | 26 | 15 ,, | 26 | 15 ,, | 26 | 14 ,, | 26 | 15 ,, | 26 | 14 ,, | 26 | 15 ,, | 26 | 15 ,, | 26 | 14 ,, | 26 | 17 ,, | 26 | 16 ,, |
| 27 | 18 ,, | 27 | 18 ,, | 27 | 16 ,, | 27 | 16 ,, | 27 | 15 ,, | 27 | 16 ,, | 27 | 15 ,, | 27 | 16 ,, | 27 | 16 ,, | 27 | 15 ,, | 27 | 18 ,, | 27 | 17 ,, |
| 28 | 19 ,, | 28 | 19 ,, | 28 | 17 ,, | 28 | 17 ,, | 28 | 16 ,, | 28 | 17 ,, | 28 | 16 ,, | 28 | 17 ,, | 28 | 17 ,, | 28 | 16 ,, | 28 | 19 ,, | 28 | 18 ,, |
| 29 | 20 ,, | — | — | 29 | 18 ,, | 29 | 18 ,, | 29 | 17 ,, | 29 | 18 ,, | 29 | 17 ,, | 29 | 18 ,, | 29 | 18 ,, | 29 | 17 ,, | 29 | 20 ,, | 29 | 19 ,, |
| 30 | 21 ,, | — | — | 30 | 19 ,, | 30 | 19 ,, | 30 | 18 ,, | 30 | 19 ,, | 30 | 18 ,, | 30 | 19 ,, | 30 | 19 ,, | 30 | 18 ,, | 30 | 21 ,, | 30 | 20 ,, |
| 31 | 22 ,, | — | — | 31 | 20 ,, | — | — | 31 | 19 ,, | — | — | 31 | 19 ,, | 31 | 20 ,, | — | — | 31 | 19 ,, | 31 | 22 ,, | 31 | 21 ,, |

NOTE.—Black figures in above table indicate date of service.

This chart presents in an instructive form figures relating to the gestation period of brood sows. For example, a sow mated to the boar on 1st January is due to farrow on 22nd April; a sow mated on 1st July is due on 20th October. The chart should be preserved for future reference by breeders of all classes of pigs. The normal period of gestation, *i.e.*, the period from the time of conception to the birth of the young pigs, is 112 days, this period is sometimes remembered as roughly three months three weeks three days, or 16 weeks. With very young sows the period is sometimes of shorter duration, and instances are on record where young sows have farrowed at from 100 to 108 days after becoming pregnant; on the other hand, old sows in abnormal condition have been known to carry their young for more than 140 days.—E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

# DISEASES IN PLANTS.

## NEW LEGISLATION.

*A Bill to consolidate and amend the law relating to diseases in plants and for other purposes was introduced in the Legislative Assembly by the Minister of Agriculture and Stock, Hon. Harry F. Walker, in the course of the month. Subjoined is an abridged report of Mr. Walker's second-reading speech taken from Hansard.*—Ed.

### MINISTER'S SECOND READING SPEECH.

The Secretary for Agriculture (Hon. H. F. Walker, *Cooroora*): At the previous stage I gave hon. members a few details regarding the contents of this measure in order that they should have some idea of its provisions. At this stage I can add much to my remarks, and also give some idea of what the alterations consist of with a view to helping them in the passage of the Bill through Committee. The existing Acts were certainly of some use for a considerable time, and have certainly served their purpose; but, as time goes on, amendments must naturally be required to bring the legislation up to date and to deal with the particular industries affected. That is the reason why we have decided to consolidate the Diseases in Plants Acts, 1916-1924 and the Diseases in Plants Act of 1929, to which I referred in Committee, and incorporate them in this Bill. The original Act was passed in 1896, an amendment in 1916, and another amendment in 1924.

### A Necessary Measure.

The Bill covers the introduction into Queensland of any tree, plant, or vegetable which is likely to introduce any insect, fungus, or disease, and controls the removal of trees, plants, or vegetables from nurseries, orchards, and gardens within the State. In other words, the Bill seeks to control all plant life in Queensland. It is particularly far-reaching, but is necessary in the light of experiences during recent years, when it has been found most difficult to locate and control the spread of disease by reason of the minute character of the bacteria or aphides concerned, which makes it particularly essential that control should be exercised to cope with these diseases. In recent years scientific investigation has been particularly active in trying to combat these diseases, especially those affecting one of our most important industries—the banana industry, upon which I need not enlarge at the present moment, seeing that another Bill before this Chamber will give hon. members an opportunity of considering that industry.

We are all seized with the importance of production, and of the necessity of preventing the huge economic loss which occurs yearly from disease in crops, &c. That is a loss not only to those engaged in the particular industries but to the State generally. During the last few months—and no doubt the Leader of the Opposition experienced the same position during his term as Secretary for Agriculture—many deputations have approached me drawing attention to the fact that something must be done in the direction I have indicated; and the wide nature of the Bill now under discussion proves conclusively that such a measure has been needed for some considerable time.

This Bill is a consolidation of two other Acts, combined with the experience gained from recent investigations. It also adopts to a certain extent the experience of other States of the Commonwealth, particularly South Australia, proving conclusively that we must go ahead if we are to get into line with the action that is being taken in other States to deal with the ravages of plant diseases.

Mr. W. Forgan Smith: You will find that your Bill is a good deal ahead of similar Acts in other States.

The Secretary for Agriculture: The departmental experts inform me that this Bill incorporates many provisions contained in the legislation of Southern States, more particularly South Australia. It is mainly a Bill that has been initiated and worked up by the experts of the department, because, although I naturally had a little to do with it, the major portion of the Bill is the work of the departmental officers. It may be thought that the Bill is too drastic; but breadth of vision is required when dealing with the conditions of plant life in a State like Queensland, with its enormous area and its climates varying from the comparative cold of the Stanthorpe district to the tropical heat of the North.

PLATE 182.—DENSE PEAR ON A WESTERN ROAD.

Prickly-pear on the Morven-Charleville stock route, showing the density of infestation prior to the operations of the Prickly-pear Commission, which have definitely checked the further encroachment of the pear in Queensland.

PLATE 183.

Pear on a South-Western holding fourteen days after being sprayed.

### Wise Exercise of Authority.

Most of those districts grow fruit of some description or other, which is more subject to disease than ordinary plant life. We are asking for great powers under this Bill, but so long as the administration is sympathetic no harm can be done. All Bills, no matter how hard or how soft they may be, can easily be spoiled by unsympathetic administration.

Mr. W. Forgan Smith: It all depends on the wise exercise of authority.

The SECRETARY FOR AGRICULTURE: Exactly. This Bill can be spoiled if it is not handled sympathetically. Knowing the menace gathering around us to-day due to the fact that we have not sufficient power under present Acts to deal with many plant problems quickly and effectively, anyone occupying the chair I have the pleasure to occupy to-day must realise his responsibility in respect of the plant life of Queensland.

I venture to say that, if the danger of "bunchy-top" had been realised a few years ago, legislation of this character would have been brought in, and we would never have seen the disease as far North as it is found to be to-day. When I inform hon. members that "bunchy-top" has spread from the Tweed River to a little north of Buderim, it will show them how the disease is spreading; and we hope, with the assistance of a measure such as this and with the help of scientists, to control "bunchy-top" effectively. If not, we shall hold it back until scientists get to work so that it will not be allowed to spread to the beautiful country on the Tully River in North Queensland. . . . . In the Bill which I shall presently introduce provision is made for that matter to be handed over to a board consisting of two growers' representatives and two Government representatives, who will deal with it in whatever form they think fit, subject to departmental control.

### The Insect Menace.

In recent years mankind has realised just how much our material welfare depends on successfully combating the various insect pests, fungus growths, and other diseases attacking economic plants on which we are so largely dependent for our food supplies. Competent observers believe that it is no exaggeration to say that the future will witness a severe struggle between man and insect for the world's available food supply. We have to be up and doing. We have to work hard and avoid unnecessary delay. We have to follow the lines we would like to follow if we owned Queensland individually. If Queensland was our private property, we would not wait for someone in some other part of the world to move when there was any danger ahead. We would immediately be up and doing, and that is what we want to do to-day with regard to things which are a menace to the food supply of the people of Queensland. Our first line of defence against new pests and diseases is the new Federal quarantine law and the vigilance that is being exercised to prevent further pests from gaining access to Australia. Of course, we are backed up in that direction by having a long sea boundary around us which ensures remoteness from other countries.

I venture to say that no disease can come here by air and become a menace to Queensland—it would die a natural death on the way—but we have pests inside our shores which have to be combated. In Queensland, for instance, our efforts so far have not been a complete success. We are still faced with many serious troubles within our gates. We have had an enormous number of pests introduced here, and I should not be surprised if 90 per cent. of the pests found here at the present time have been introduced in some form or another from other countries; but it is very hard to detect on the unloading from a ship of certain vegetable foods or grain, cotton seed, or anything of that description, anything that may be a disease, or that could be liberated in many cases without being detected by the departmental officers, who are particularly alive to the interests of Queensland in the discharge of their duties. That will give some idea of the serious nature of the question and how hard it is to keep such diseases within reasonable bounds in Queensland and other parts of Australia. . . .

### Plant Disease and Its Economic Effects.

Dealing with the Darling Downs wheat crop, for instance, we all know how fine a crop we shall have this season, due to the very good rains. It would be a deplorable loss if any disease reduced the yield to a couple of million bushels—about half the anticipated crop this year. There are at the present time a great many other diseases that affect that crop. For instance, flag smut last year and

up to the present time has been responsible for an enormous loss. Then there have been losses from other pests In combating diseases we have to take into consideration in regard to the farmer that there are serious losses from other causes than the uncertainty of seasons. The farmer has to combat danger from marsupials; and Queensland farms seem to have more marsupials to contend with than any other country I know of.

PLATE 184.—WHAT A PROGRESSIVE FARMER HAS DONE IN THE GAYNDAH DISTRICT.

Two views, showing heavy pear infestation on virgin land, on portion 47, parish of Wetheron, when selected by Mr. W. Benham. (See illustrations on the next page.)

Then the cotton crop is of vast importance in Queensland; and we are hoping that it will be more free in the future from pests than previously, as in the past various diseases have caused no end of trouble in connection with that crop. When cotton was introduced here and the question of ratooning came up, it was a debatable question whether the boll-weevil, commonly call the corn-ear worm, which attacks similar plants, backed up by many other weevils, was responsible for enormous

loss, and in some parts of the world would not practically annihilate the industry here. Through the care of the farmers in Queensland we are now producing cotton almost free from the diseases which affect many other countries. When cotton was produced in the Lockyer district the boll-weevil almost wiped it out. Fortunately the people there were able to switch on to some other industry, such as maizegrowing and dairy farming, and so did not feel the loss as severely as the settlers in the drier Burnett and Rockhampton districts, where farmers cannot go in for the other

PLATE 185.

The same land on Mr. Benham's well-managed farm to-day, illustrating what can be done by practical methods of pear destruction and land settlement.

crops which I have mentioned. We all know that the value to the State of the maize crop, particularly on the Atherton Tableland, is very great; and we can imagine the effect of pests similar to the boll-weevil in cotton attacking that crop. They have at present to combat top rot, which has caused enormous loss. I venture to say that, if we could successfully fight this pest, it would add 20 per cent. to the value of the crop to the grower, and I am confident that the consumer also would get the benefit to a great extent.

Then we come to the banana-growing industry. Here we have the borer. We all know what that is. It has travelled from the South, and is now right up North. It brings about a general weakening of plant life. Then there is "bunchy-top," which appeared in the industry some seven or eight years ago, and has spread over the whole of the Southern district. We have been conducting experiments, but, generally speaking, we can look upon the beetle borer as the principal menace to the banana-growing industry.

Mr. W. Forgan Smith: Have you heard how the parasites from Java are getting on?

The Secretary for Agriculture: Unfortunately, we cannot yet prove that they will be effective; still, there is hope in that quarter. We must not interfere with the eggs of the insect until the experiments are complete for fear that we destroy the work that the entomologists have already done. It is the scientist on whom we must rely. It is unreasonable to expect the farmer to do these things. In the first place, it is too expensive, and the experiments are too complicated, and in any case he has not the time to devote to the work.

Another disease which affects banana is leaf spot, which is taking a heavy toll of the industry to-day. Perhaps it is a greater menace than the beetle or "bunchy-top," owing to the fact that it closes up the pores of the plant and strangles it. We have authorised the employment of a pathologist to try to cope with this disease, or, at any rate, to check it. Hon. members will see that these three combined must present an enormous menace to one of the finest industries we have, and one which is the most calculated to assist closer settlement. When you remember that at the present time the people of Australia eat only about half the bananas that the people of America eat, you appreciate what a tremendous future the industry could have if we can only save it from the ravages of pests.

Then, in regard to citrus fruits, we have the bronze orange bug, the spiny bug, and many scale and other diseases. A list of them shows the heavy losses the citrus-growers must be suffering to-day.

Then we come to the apple-grower, who is situated in an entirely different part of Queensland. That fact reminds hon. members that we require a measure that will enable us to impose the necessary drastic restrictions to protect the apple-grower in the South as well as the banana-grower in the North. In the apple districts we have to cope with the codlin moth and the fruit fly, and this Bill provides for protection from those pests in the hope that better results may be achieved and the present losses minimised.

The pineapple-grower does not escape. He is worried with what they call water blister, which is causing enormous losses. Fortunately, the price has been such lately that the pineapple-grower has been able to stand a little loss. Our aim and object, however, is to grow bananas, pineapples, and all plants without loss from disease at all.

Then we have the diseases which attack crops like the tomato and the potato. There has been some controversy lately as to whether the tomato is a vegetable or a fruit; but, whichever it is, it is very nice to eat. There are diseases which cause enormous losses in connection with both these crops.

Then we come to sugar-cane. I venture to say that hon. members who represent sugar-growing districts may be surprised to know that on looking over the particulars given me by experts I find that sugar-cane suffers from more diseases than any other crop we produce. The department has done wonderful work in trying to combat these diseases. Of course, the organisation of the sugar-growers themselves is entitled to a certain amount of credit for what has been done; but, apart from that organisation—which is a credit to the State—the Government have also done something to combat the borer and other diseases which attack cane.

Roughly speaking, that pest has caused a loss of £120,000 per annum. That is an enormous loss, and will give some indication as to why it is necessary that a Bill of such a drastic nature as this should be introduced. An enormous number of pests and a large number of industries will be controlled by the one measure, and that is the reason why this Bill appears to be of a drastic character to a certain extent. An additional feature in connection with the Bureau of Sugar Experiment Stations has recently been brought into being by the appointment of a sugar-cane pathologist to provide the cane farmer with information as to how to combat diseases and clean up the farm.

PLATE 186.—THE PEAR-POISONERS' WORK.

Poisoning is less arduous than burning, and the plants are killed where they grow, instead of being moved, and thus increasing the risk of reinfestation from dropped leaves and fruit.

PLATE 187.—POISONED PEAR ON VIRGIN COUNTRY.

The work of the Prickly-pear Commission well illustrated.

### A Public Duty.

I think it is just as well now to leave the question of diseases and to remind hon. members that it is the duty not only of hon. members but also of those engaged in farming industries—particularly those who take a prominent part in various agricultural organisations—to try to enlighten the farmer on the subject of combating many of the diseases, and to achieve that end through the organisation and by means of literature circulated from time to time. If that were done, it would mean an enormous advantage to those concerned, and be of considerable assistance to the department. Roughly speaking, the estimated loss in primary production due to pests and diseases ranges from 5 per cent. to 20 per cent. and even 25 per cent. on crops produced in Queensland to-day, showing that when the Bill is passed and becomes subject to sympathetic administration it will effect an enormous saving in the loss that now occurs. That loss clearly indicates the urgency of taking drastic action. That factor is recognised, not so much from the point of view of increased entomological and pathological investigation but from the point of view of the legislation necessary for the enforcement of measures designed to combat the different pests and diseases.

As I have already stated, the original Act was passed in 1916. It was amended in 1924, when provision was made for the constitution of a board of advice. There is no doubt that at that particular time the board of advice, which consisted of the heads of the various branches of the department, had the advantage of the services of particularly able men. . . . We are superseding that board by a board of experts controlled by the department—a board that will be in touch with the incidence of plant disease all over Queensland, and will report direct to the Minister. The board of advice has been out of existence for some considerable time, and we do not intend to reconstitute it. The Bill will serve the dual purpose to which I have already referred. It provides for the examination of all plants, fruit, and vegetables entering the State, and provides for the imposition of a charge for the necessary examination. That will be given effect to by regulation. It is not proposed in any shape or form to tax the small man who has a home in Brisbane or any other town in Queensland. We want him to go on in his usual thrifty way growing vegetables and plants of other descriptions to reduce household expenditure or for experimental purposes, but in other cases it is intended to exercise control. We cannot allow "bunchy-top" in a man's back yard on one or two banana plants, thereby becoming a source of danger to surrounding farms. It is our object to prevent the spread of "bunchy-top" leaf spot, and other diseases from spreading to adjacent farms and then operating at large very much to the detriment of our State.

I have already referred to the fact that it is the intention to examine all plants, fruit, and vegetables entering from other States, and I think I should point out that the other States of the Commonwealth have passed similar legislation, thereby demonstrating the wisdom of introducing this legislation. The Diseases in Plants Act has been responsible for protecting Queensland from the invasion of many diseases up to the present time.

### Administration of the Measure.

For evident reasons work has been carried out in the past in respect of plants, fruits, &c., coming into Queensland from other States; but this Bill will give power to cover the whole lot. Naturally, finance comes into this Bill to a great extent, because to carry out all the things the Bill provides for, in addition to the powers it confers, a regular army of inspectors would be required in the industries to which I have referred; but, by the incorporation of the other Bill, which I have said is supplementary to this Bill, there will be an enormous saving effected to the banana industry. The men now loading bananas and carrying out inspectorial work will be used for a dual purpose. This will effect an enormous saving, and provide the department with greater control over them. Naturally, the work they do will be reflected in a good deal of saving of time to the department. Freer action to work is necessary; and, when a report is received from a field inspector in regard to a particular disease, and it also covers anything suspected of being a disease, prompt action will be taken. That may seem drastic, but action in such a case is necessary and warranted. We want disease reported as quickly as possible with a view to combating it, or to keeping it in check for the moment with a view to combating it ultimately. Any disease affecting trees, plants, fruits, or vegetables caused by an insect, fungus, or any other disease is to be dealt with promptly. The present Bill has the support of all our organisations. As a matter of fact, they have asked for it knowing full well that we have not the power under the present Act to control disease effectively.

The definition of "abandoned or neglected orchard or nursery" is a new idea, and is one which requires a little thought before criticism is made with respect to it. We have had an enormous amount of trouble up to the present in connection with abandoned orchards. Only last week I gave instructions for several orchards to be cleaned up because the department was not able to locate the owners. Several orchards were abandoned and reverted to the Crown. We had them cleaned up, knowing the menace they were to the industry, and knowing that they were right on the border-line. An abandoned orchard may not be affected by disease at the time of its abandonment; but it is likely to create disease on account of the heavy weed growth which comes up all over it in consequence of its abandonment. It is then a greater menace than an orchard affected with "bunchy-top," which can be immediately dealt with. This Bill provides that, after a period of six months, on an inspector proving an orchard to be an abandoned orchard, the department shall have power to enter upon and remove the trees growing therein. If there is no owner of a neglected orchard, we have to find out whether the orchard has reverted to the Crown. If it has not, then the owner pays pound for pound in connection with the expense of cleaning it up.

The Bill further provides that the owner of a banana orchard must keep his orchard clean for a distance of 1 yard around each stool. Naturally, the number of plants in the stool increases. Sometimes an owner grows four or more in a stool; but it has been proved that the growth of three plants in a stool is the best method. That enables a man to get into his orchard after heavy rain and to clean up for a yard around each stool, and later to take out the weed growth. The object of this clause is to give him a chance to keep his plants clean, and, naturally, if he keeps his plants clean, as good farmers generally do, disease is obviated. We find that power absolutely necessary. Power of appeal is provided for in certain cases where action is taken to deal with abandoned orchards. This is a new departure, but I understand that it was considered in 1925 and 1926. When this Bill is passed, if an owner has a grievance, he has the right of appeal without going to law. It is a cheap method of getting over the whole trouble, and one which, in my opinion, will have the desired effect of giving a man satisfaction, and at the same time enable the department to clean up the whole of the affected area.

The definition of "disease" has been widened by adding a provision which will enable an inspector to deal with suspiciously dangerous symptoms, which he may not at the moment be able to diagnose definitely. For instance, where a plant shows symptoms which, in the opinion of an expert, look like a disease, the inspector can immediately quarantine that plant. The object is not to allow something to get hold which may later on prove a menace. The vegetable pathologists attached to the sugar branch of the department specially asked for this provision; and a recommendation from such an authoritative source cannot be ignored.

The definition of "occupier" will now be "the person in actual residential occupation of any land." The old definition of "occupier" was "a person in actual occupation of any land, or, if there is no such person, then the person entitled to possession thereof." That caused a considerable amount of trouble, but under the new definition, if a lessee has abandoned a property, the department will be in a position to approach the owner at once.

There is another clause in the Bill which provides that the cost incurred in cleaning a plantation shall remain a first charge on the land.

The registration of orchards is also provided for. A fee for registration may be charged—that will be done by regulation—but it will be a nominal one.

Under the Bill which I propose to introduce later this afternoon in connection with the banana industry, provision is also made for inspectors to report first to the board and then to the department in connection with the issue of permits for planting new areas. We propose that the board shall constitute a board of appeal to see if the inspectors have done their work wisely and judiciously. It will be seen that the Bill now under consideration enables fresh planting to be controlled, even when a grower uses plants grown on his own property.

Provision is made to prohibit the introduction of any insect or fungus except with the consent of the Minister. Naturally the matter will be decided by the expert to whom it is referred.

Failure to gather and destroy fallen fruit is now made a specific offence. That has caused enormous trouble, more particularly in the citrus fruits districts. It is made obligatory on the part of the owner to clean up his orchard. Power is given to inspectors to clean up a place and recover the cost.

**Provision for Compensation.**

There is also provision for the payment of compensation where healthy plants are destroyed to prevent the spread of disease. For example, we may want a quarantine area, and it may happen that healthy plants are destroyed in that area. It is proposed that compensation shall be given in respect of those healthy plants.

PLATE 188.—THE ATOMISER AT WORK.

The supply of cheap and effective poisons for the destruction of prickly-pear and apparatus for their application has made it possible to control infestation on clearable land. In this way a greater area can be effectively cleared in a given time at a far cheaper rate.

PLATE 189.

An eloquent testimony of the value of the service of the Prickly-pear Commission to Queensland. A stretch of reclaimed forest country, near Mundubbera, now carpeted with nutritious natural grasses.

Similarly, if we should decide to proclaim an area, say, from Eumundi to the Burnett watershed to keep back "bunchy-top," we would have to compensate the owners of clean banana orchards in that district.

Fighting plant diseases is considered to be one of the most important functions of Departments of Agriculture in every part of the world. Many highly-trained specialists are maintained; legislation, often of a very drastic nature, is enacted; and large sums of money are spent for this purpose, as it is universally recognised that profitable returns cannot be obtained unless plant diseases are constantly and systematically fought. The Bill, if passed, should have the effect of materially reducing the loss that is being annually sustained by our primary producers as the result of the damage caused by plant pests.

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## SOILS IN THE NORTH-WEST.

### ON THE OPEN ROLLING DOWNS.

Leaving Townsville by car on the 14th September, Mr. N. A. R. Pollock, Northern Instructor in Agriculture, accompanied by Professor Prescott of the Waite Institute, Adelaide, Mr. Hines of the Brisbane University, and Mr. Winks of this Department, who were desirous of making an inspection of the principal soil types of the North, entered on an interesting tour of duty.

The profiles of soils from desert sandstone at Sellheim, the black and red soils from granite at Charters Towers, the recent alluvials at Balfe's Creek and elsewhere on the road to Pentland, desert sandstone soils near Torrens Creek, typical black soils between Torrens Creek and Jardine Valley, the downs' soil both brown and chestnut from Hughenden to Winton via Richmond, and a further example of the desert sandstone soil at Colane near Winton, were all examined on the outward journey.

Professor Prescott expressed himself as well pleased with the result of his inspections and stated that the soil of the rolling downs country was comparable with the black soil regions of Russia and the prairies of America. He was emphatic in agreeing with the opinion so frequently stressed by Mr. Pollock that the growth and conservation of members of the Sorghum family for fodder, either as grain, hay, or ensilage, in the rolling downs regions were not only practicable, but necessary to provide for periods of shortage, and stated that under similar rainfall and climatic conditions in the Sudan, where he had been stationed for a number of years, the cultivation of Sorghums largely for grain was the chief industry.

Professor Prescott and party remained at Winton and left later for Longreach. Mr. Pollock went on to Kynuna, Mackinlay, Gilliat, and other centres to Richmond, and then back to Townsville.

During his travels the unequal distribution of the rainfall last season was evident in well-grassed areas contiguous to others on which there was little or no feed, this alternation being noticeable in all the districts passed through.

Graziers who had not been favoured with sufficient rain had experienced no difficulty in securing agistment for their sheep at no great distance from their holdings on country that was lightly stocked as a result of flock depletion in recent dry years. All sheep noticed were in excellent condition, while the pasturage was calculated as sufficient to last until the rains of the wet season commence.

Interest in the growth and conservation of fodder, he found, has increased rather than diminished, while the use of phosphate licks is becoming general.

At Colane, near Winton, Sudan grass germinating after a fall of rain in April had given excellent results, being cut for hay and grazed by sheep during several months. At the time of his visit, though most of the Sudan had died several clumps were showing a growth of up to a foot in height, despite the fact that no rain had fallen since April.

At "Colwell," near Mackinlay, Mr. Desmond Collings had made experimentally a small quantity of silage from summer grasses cut in the channel country. Though a good deal of waste occurred by reason of the unchaffed material not being compacted in the small pit provided, the centre was excellent and greatly relished by the house cow to which it was being fed.

Arrangements have been made to supply seed for trials with Mr. J. M. Chisholm, Wantalayna, Winton; Mr. E. P. Phillott, Colane, Winton; Messrs. Collings and Wells, Colwell, Mackinlay; and Mr. C. Morell, Lonsdale, Richmond. Mr. Morell expects to have somewhere about 80 acres under crop, when, if a normal season is experienced, a satisfactory demonstration of fodder growth and conservation should be obtained.

# COMMONWEALTH SOIL RESEARCH.

## ADDRESS BY PROFESSOR J. A. PRESCOTT.

PROFESSOR PRESCOTT, Chief of Division of Soil Research, Council for Scientific and Industrial Research, addressed a gathering of officers of the Departments of Agriculture and Stock, Public Lands, and the Provisional Forestry Board in the Land Court Room, Brisbane, on 8th October. The Minister for Agriculture and Stock (Hon. H. F. Walker) presided.

### The Story of Soil Research.

Professor Prescott said that the purpose of his meeting those present was to enable him to express some of his general impressions, and to tell something of the story of Commonwealth soil research. Some of them might perhaps be interested to learn something of the origin of the Commonwealth soil work.

The Waite Institute of the University of Adelaide was barely five years old and was founded as a result of a donation of £100,000 to the University of Adelaide by Mr. Peter Waite, a South Australian pastoralist. Mr. Waite intimated to the University that it was to help his brother farmers that he had donated that large sum. Among the problems which the University of Adelaide had set itself to solve were those relating to crop production primarily, and soil problems as one of its branches. Soil problems, of course, interested them primarily from the agricultural point of view, but they were beginning to realise the importance of research work in connection with pastoral soil problems, in the study of which Mr. Brünnich (Queensland Agricultural Chemist) had led the way, especially in relation to animal nutrition.

### Southern Investigations.

The Commonwealth Council for Scientific and Industrial Research some two years ago found itself in the position of being responsible for two experimental stations, both in the irrigation areas, in which soil problems were of extremely great importance. On the irrigation areas of the Murray and Murrumbidgee were a number of soldier settlers, many of whom were struggling to make a living, and before any advice could be given to those men as to the fertilisers to be used, it could be seen that a soil survey would have to be taken so as to get a complete understanding of local soil types. They set to work at Renmark, in South Australia, where on the irrigation area there were about 4,000 acres occupied by returned men producing dried fruits under very adverse conditions. The difficulty, of course, was to find a suitable man to carry out that work. There was only one man in the whole of Australia who had had any experience at all in soil survey work, and that was Mr. Taylor. He had been sent to the United States of America by the New South Wales Government to study soil survey methods, and they were fortunate enough to secure his services from the New South Wales Department of Agriculture. This work indicated to them that there was a very close relationship between the productivity of the soil and the actual soil type as defined by the survey.

The next area they investigated was that of Wimmera, in Victoria, where there was a settlement of returned men on reasonably good land. It was found that there were something like five different soil types in an area of 2,000 acres, and the difficulty there was that the Irrigation Commission was supplying the same quantity of water to all the men, and it was necessary to get some understanding of the soil types so that this service might be beneficial.

The third area they investigated was the Lower Murray swamps. They had been reclaimed, some of them fifty years ago, and others since the war, and they presented an entirely new soil type in South Australia, if not in Australia as a whole. Lucerne was the main crop grown, but there was a tendency for the dairy farmers to rely on perennial pasture. As a result of their survey they could almost definitely state that this inclination for the practical farmer to drop lucerne and go in for permanent pasture had a sound scientific basis. The soil was not a lucerne soil at all, although it had been growing lucerne for twenty years or more.

There were several thousand acres in the Murrumbidgee and Murray Valley, and it was, of course, a very difficult matter to attempt to survey those soils within a short time. They were not attempting to do it, but had given themselves twenty years in which to carry it out. The reason for the delay—if it could be called delay—was the fact that the work demanded special training, for the men could only get their experience in the course of the work, and they must be fully qualified for it if it was to be placed on a sound basis.

### Soil Survey and Classification.

In the Murrumbidgee Irrigation Area they were working on a special type of soil which was suitable for rice growing. There again the Irrigation Commission thought the soil was a lucerne soil. It proved entirely unsuitable for lucerne, but most suitable for rice. This illustrated the necessity of strict scientific methods when soil surveys and soil classifications were being made. The Government expected the classification of the soil to be according to its productivity. There might be first, second, and third class forest land and first, second, and third class agricultural land. The third-class forest soil might be better than the first-class agricultural soil, or vice versâ. That classification was only a temporary one. It depended on the economic conditions of the time at which the classification was made, so that it was necessary for them to adopt a system of classification which would extend beyond any economic point of view and which would stand for all time.

### In Other Countries.

There were two countries in the world in which soil survey work was being carried out as part of the duties of the Department of Agriculture—the United States and Russia. The United States had a fully competent soil survey, which had been going on for somewhere about twenty years. Their methods had been changing gradually, and to-day they had fallen in line with methods which were universally recognised. Something like one-third of the United States had now been completely surveyed. Unfortunately, the area that was of most interest to us in Australia (the arid zone) had only been surveyed in part, but a considerable portion of Texas had already been described.

The other country which had contributed most, possibly, to soil survey work was Russia. We were accustomed to regard Russia as one of the backblocks, but for something like fifty years the Russians had been engaged in soil survey work, and there was more known about the soils of Siberia than there was about the soils of Australia. The Russians had developed their methods so much that they felt themselves competent to draw two maps of Australia, indicating the soil types—one in 1914 and the other in 1928. These two soil maps were really wild guesses, but at the same time they were shrewd guesses, and one of Professor Prescott's purposes was to correct Glinka's guess and place it on a sound scientific basis based on observation. A soil survey map from an advisory point of view would be of great benefit. For instance, there was the case of the Renmark survey. The Irrigation Commission was actually waiting for the soil map of Renmark and within a day of its being drawn up were able to call a meeting and to act immediately on that survey. There were something like 2,000,000 acres of land in the Murray Valley which could be irrigated, and this would be done when the Hume dam was completed. He believed there were more like 10,000,000 acres which were capable of being irrigated—that is, they had the proper slope, and other features. It was obvious that they must utilise these 2,000,000 acres in such a way that they would be as productive as possible. To do that they must have a knowledge of the various soil types in that area.

### Russian Research.

The next scale in connection with soil maps was the broader one, in which one could make full use of scientific methods. He had already indicated that the Russians were able to classify soils in such a way as to map a whole continent, and that was based on a recognition of two main factors—one of which was the recognition that the soil is something in itself. The original soil classification was based on the fact that the soil came from granite or some partly disintegrated rock. The Russians recognised that the soil was something quite independent from its parent rock. They developed a technique in which they described the soil just as they found it. In that way they were able to classify soils into a series of types.

The lecturer continued:—The first type that they defined is known as the Podsol or Ashlike soil, and this type is found in the Wallum country of Queensland or the gray soils around Brisbane. It is generally regarded as forest savannah country such as the pine forests of Northern Europe and Northern Siberia.

The next type is one which was not familiar to the Russians, known as the Brown Earth. It carries the greater part of the wheat in the Southern States, and it is one of the most serviceable of all soils in temperate regions. The fact that it does not leach readily means that it rarely needs liming. It may be low in plant foods, but under special conditions the Brown Earth may be rich in plant foods.

The Red Basaltic Loams are soils which are endeavouring to turn themselves into Brown Earths. They form a group by themselves, and are found in Queensland at Bundaberg, Childers, and the Atherton Tableland, also in Northern Tasmania.

There is a type of soil called Laterite which is of extreme scientific importance. It is one in which Mr. Hines and Dr. Bryan, of the Queensland University, are taking a great deal of interest at the present time.

The next soil type—which occurs in a zone where the rainfall is sufficient to produce a good native vegetation—is the famous Black Earth, first described thirty years ago by the Russian workers from their knowledge of the Russian Steppes.

**Queensland Soils.**

In Queensland there is the greatest development of Black Earths in the Empire outside of Canada. Black Earths develop under conditions where there is a rainfall of approximately 20 to 30 inches. They are seen at their best on the Darling Downs, and also the Liverpool Plains in New South Wales, and Peak Downs, Upper Callide, and Upper Burnett. They are rich in lime, so rich that it would always be found sufficiently marked for one to see it in a section of soil at a depth of from 15 to 30 inches. In South Australia, strangely enough, this Black Earth does not occur. There is another related series also very rich in lime, which was not described by the earlier Russian workers, but was actually discovered in Siberia. This series is very closely related to the Black Earth, and occurs in the rolling downs of the West, also in the black soil plains of the South-west and the Western plains of New South Wales in the Riverina and Wimmera. It is interesting to note that the lands at Hughenden are identical so far as soil type is concerned with the soil of the Wimmera. It is also interesting to note the difference that rainfall makes on the value of such land. In the Wimmera, it is worth about £15 per acre, and in Hughenden it would scarcely be worth 10s. per acre. The difference, of course, is entirely due to rainfall. The rainfall of Queensland is a summer rainfall, very unreliable. The rainfall of the Wimmera is just ideal for the production of wheat, and 40-bushel crops are quite common on that soil. The Riverina is a little less reliable, in so far as some of the rain comes in summer. Similarly in Queensland the Brown Loam or the Brown Downs soil is not a wheat soil, except in the Darling Downs, but is essentially a sheep soil.

In Africa, where these Brown soils were also developed, they were used for sorghum growing, and there was a possibility that the solution of the feed problem would be found if it were recognised that this soil is essentially one of the best growing soils if the climatic conditions could be studied sufficiently to get an appreciation as to which crop would be most suitable for the growing of sufficient fodder.

**The Basalt Series.**

The next are the Basalt series, such as are found in the Mallee country and at Oodnadatta. On this soil in the Wheat Belt of South Australia, crops are being produced with a rainfall of less than 6 inches.

"I would like to get some expression of opinion from the people here in Queensland," continued Dr. Prescott, "regarding the way in which the Commonwealth work can be linked up with the work that is projected for Queensland itself." It was one of their aims to publish a soil map of Australia in reply to the one published by Glinka last year. He was hoping that such a map when published in Australia would lead to discussion among scientific people, so that the map could be corrected by agricultural officers and surveyors, mining engineers, &c. As an aid to that work maps were being prepared and in part published in South Australia and Western Australia, showing the distribution of native vegetation prior to settlement. The surveyors throughout Australia had discovered very early that the native vegetation was a very fine index of the possibilities of the soil. He would suggest that one of the things that could well be done in Queensland would be the preparation of a map showing what was already known of that native vegetation and of the soil types.

**Future Plans.**

The Commonwealth Division of Soil Research had not yet been founded completely. The agreement with the University of Adelaide would date as from the 1st June, 1930, and it was their intention, in addition to having a map by a man working on soils problems, to have a soil survey staff which would be trained in the irrigation areas of the Murray, and which would eventually take an interest in soil problems throughout the whole of Australia, and if such a survey staff could be associated in the initial work of the Queensland survey, they would be very happy to secure co-operation in that way. The future of the soil survey of Queensland would depend very largely on the men who were placed in charge of that work, and the closer settlement and economic development of Queensland.

## DISCUSSION.

Mr. H. T. Easterby (Bureau of Sugar Experiment Stations): Does the Commonwealth intend to prepare a soil map for the whole of Australia eventually?

Professor Prescott: What I personally hope to do as a result of this visit to Queensland—because Queensland is the key for the whole of Australia—and also my visits to Tasmania and Western Australia, is to write a discussion for the benefit of my Australian colleagues, of the principles underlying modern methods of classification, and in the course of that discussion I hope to put right Dr. Glinka's two maps. I already have a tentative map of Australia, which is not correct, but I hope to publish another map which will form a basis for future discussion.

Mr. Harvey (Lands Department): The Development Committee is faced with many problems in survey, more particularly in areas that are likely to become closely settled, and it would be helpful to us if Dr. Prescott could indicate to us some of the methods for more detailed examination of the soils in closely settled areas, and if he could indicate the type of survey that is required for the different conditions of settlement, I am sure it would be of great help to the committee.

Professor Prescott: That, of course, is a question of detail, and is one reason why I generally insist on the soil survey being in the hands of well-trained men, who are sufficiently responsible to select their methods for themselves. Mr. Taylor has a free hand in that direction entirely. The detail required in a survey of blocks of 20 acres is very different from what is required for blocks of from 600 to 700 acres, which would not need the close survey necessary in an irrigation settlement.

The general principle is really to have a staff of field officers adequately trained in soil survey methods. They go to a certain district and set to work at once to define the soil types from a purely scientific point of view. Generally speaking, there are people in the district—officers of the Departments of Agriculture and Lands—who can give them some idea as to the possibilities of the district, and this would act as a guide for them in their work. We dig holes at intervals and examine the soil profile at a depth of from 4 to 8 feet, and in some cases deeper. That soil is described, and when the whole area has been covered, the surveyor gets to work and maps it out. We are also enlisting the assistance of the Royal Air Force to help us in our work. They have prepared mosaics of the whole of the Renmark settlement. Aeroplane maps do not show soil types, but they show very distinctly the native vegetation and crops, and I should say that half of our work has already been done by the Air Force in the Renmark area, and I would not like to commence any survey in irrigation areas without a preliminary aeroplane survey of the native vegetation. In Rhodesia an aeroplane survey has been made to determine biological formations in connection with prospecting, and it has been very successful.

Mr. Swain (Chairman, Provisional Forestry Board): As you know, Dr. Prescott, Queensland is a very huge place, and we have in mind the idea of making a soil survey of the whole of it in due course. I think the principal proposals are first of all to make an extensive survey of the whole, using the vegetation as an index, and then to concentrate on particular areas for an intensive survey. We apparently have done neither of those two things, and we as a committee would like to know just where we should start and how we should start. The suggestion of the Air Force seems to be a very good one. We know something of the question of vegetation, and Mr. Harvey (Surveyor-General) has prepared many maps. With regard to the detailed soil survey, the question is where we should start that intensive survey—whether it should be, say, in the Cooktown district, where we know practically nothing of the possibilities, or in the Brisbane district, which is capable of intensive development. That is the issue in my mind—where to start the intensive survey, whilst planning some extensive work on the whole soil survey of the State.

Professor Prescott: The actual starting point depends very largely on local circumstances, but I would like to say in the matter of soil survey that the surveyors should be permanently engaged as field officers, rather than that the soil survey should be a side-line. They must be gaining experience. Usually, in our organisation in South Australia we have a senior soil surveyor and junior surveyors, and as men become available I shall add to the junior staff. In the Brisbane district, I think you will find that Dr. Bryan and Mr. Hines would be only too pleased to co-operate with the Department of Agriculture.

Mr. Graham (Under Secretary, Department of Agriculture and Stock), in moving a vote of thanks to Dr. Prescott for his informative address, mentioned that the Development Committee had in mind a soil survey of Queensland, but they were only feeling their way in connection with that particular work. Mr. Brünnich (Agricultural Chemist) and other officers had done much that might perhaps form a basis for future work. Queensland would remain a primary producing country for many years to come, and soil surveys would have a most important influence on efforts to increase production.

Mr. EASTERBY, in supporting the vote of thanks, said that the Bureau of Sugar Experiment Stations had done much in the matter of soil surveys in Queensland. Dr. Kerr had been specially sent to America to study the methods adopted there, and the sugar industry in the State would benefit as a result of his experience in the United States.

Mr. BRÜNNICH also spoke on the importance of Dr. Prescott's visit. He had been more or less responsible for the arranging of Dr. Prescott's itinerary, and knew that his visit would be of much benefit to the State.

Dr. PRESCOTT, in responding, expressed appreciation of the work which Mr. Brünnich and others had done, of the fine spirit of reciprocity he encountered in Queensland, and of the practical and valuable assistance that he had received from officers of the Department of Agriculture, and of the cordial reception accorded him by co-workers in the scientific field.

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## SUMMER CULTIVATION IN THE ORCHARD.

In reminding orchardists that the cultivator should be kept at work in order to maintain the surface soil in a proper condition, officers of the Fruit Branch of the Department of Agriculture point out that the use of the cultivator not only maintains a surface mulch and destroys weed growth, but also encourages vigorous tree and bud development. Keeping the soil in good tilth is a very important factor in successful orchard management.

Water rises in the soil by the process known as capillary attraction. The rise of moisture in the soil and the checking of it may be demonstrated by a series of glass tubes, the first being very fine and the others somewhat wider in diameter. The tubes are set upright in and projecting well above the surface of a vessel containing water. It will be found that the water in the very fine tubes will rise to a considerable distance above the level of the water in the vessel, and as the tubes increase in diameter so the height to which the water rises in them decreases.

The soil particles run together, forming minute spaces through which the moisture rises to the surface of the soil, where during the hot summer months it soon evaporates. Cultivation tends to break down the capillary tubes in the top layer of soils, thus retarding the rapid rise of the moisture to the surface and reducing the loss of evaporation to a minimum.

Soil left in a very rough condition exposes a far greater surface to the air than when left with a fairly fine tilth. This rough condition may be advantageous during the winter months, but is not so during summer, for the larger the surface exposed to the action of the air and sun the greater the evaporation of moisture. Summer cultivation should tend to work the soil thoroughly to a depth of 3 or 4 inches, breaking down large lumps and leaving the surface fairly even.

The question as to how often the cultivator should be used during the summer will depend on circumstances. In non-irrigated areas where the land is fairly level and the likelihood of soil washing is not great the cultivator can be used frequently, and always after rain immediately the soil is in a fit condition for working. In areas where the summer rainfall is heavy and especially on steep hillsides, summer cultivation may have to be considerably modified. In such circumstances it is not always wise to work the soil down to a very fine mulch, and it may be advisable to leave a certain amount of weed growth in strips between the rows of trees across the hillsides. These precautions will tend to reduce the loss of soil during heavy rain by preventing in some measure the rush of water down the slope.

In irrigated areas the cultivator should follow each irrigation and fall of rain as soon as the soil is in a fit condition to work. The irrigator's motto should be: "The minimum of water with the maximum of cultivation." Well cultivated plantations require less water than poorly worked ones, and are not as likely to develop seepage troubles so early.

The cultivators should be kept going right through the summer until early autumn, at which period it is usually advantageous to allow the early rains to germinate the grass seeds, where green manure crops are not sown. The day of "all the year clean orchards" has passed, as it is recognised that organic matter is essential in the soil. This may be partly provided by the ploughing under of grass that is allowed to grow during the autumn and early winter months.

# THE FARM TRACTOR.

By E. T. BROWN.*

## THE STEERING GEAR.

The steering gear must be kept in proper working order, whether the outfit be used solely on the land or partly for road work. For some reason or another this component of the farm tractor is frequently neglected. The operator should consider it an important duty to look after the lubrication of the steering mechanism.

Owing to the conditions under which the tractor has to work, mud and grit enter these joints, and, if allowed to remain, will inevitably, and in a very short time, produce wear and slackness. It is commonly thought that slackness is not of much moment. In reality, it is of great importance, not only from the mechanical point of view, but from that of safety as well.

When the tractor is new the driver finds that he can place his outfit wherever he may desire, and he has a feeling of confidence that he is able to do so. After neglect he finds that this is impossible, and he is, therefore, in doubt as to whether he can steer his machine at will in the desired direction. Failure to do this is, of course, of greater consequence on the road, but it is also troublesome on the land.

### Points to be Looked After.

All joints should be lubricated in accordance with the maker's instructions. Grease should be used where grease is recommended; oil where oil is advised. Periodic attention to this part of the machine well repays the operator for the little trouble involved. It may prove helpful to discuss a typical steering layout and indicate those points that require lubrication, and also where a slackness may develop.

Beginning with the front wheels the first point is the bearing upon which the front wheels swivel when turning a corner. This is the stub axle swivel pin and is one of the chief parts to keep lubricated, and to look out for slackness. Secondly, there is the lever fixed to the frame wheel hub at one end and to a rod that may either lie across the tractor or be in line with the length of the frame. The former is found in the case of transverse steering; the latter in the case of fore-and-aft steering. The point where the lever is fixed to this rod—termed the drag link—requires lubrication, and if play appear, it should be taken up.

The same care should be extended to the other end of the drag link. The joint here is between the drag link and the drop arm or steering lever, which is fitted to the end of the shaft protruding from the steering box. This, too, is sometimes spring-loaded; hence requires no taking up, but it should be lubricated.

### The Steering Box.

The steering box must be lubricated and looked after most carefully. There are many designs of steering boxes, of which the worm and wheel, the worm and nut, and the cam and roller are the most popular types. The maker's instructions should be followed faithfully, both as regards lubrication and taking up any play that may develop.

Returning to the front wheels, it is found that there is a rod tieing the two wheels together, this being known as the track rod. Its duty is to make one wheel turn when the other is moved by the steering gear. There is a joint at each end of this rod. These joints require lubricating, and, in time, stand in need of taking up.

### Shock Absorbers for Tractors.

Shock absorbers are not usually fitted to farm tractors. This is certainly a mistake on the part of the makers, since the vibration is excessive when working on rough land. There is not the same need for these additional springs when the outfit is employed on the road, since no great speed is ever attained. The tractor owner is strongly advised to fit some form of shock absorber to his machine, since they reduce wear to a remarkable degree.

Shock absorbers may be divided into two main classes. These are the hydraulic and the friction. In the former the damping action is secured by a plunger or vane moving in oil or some other fluid. In the latter the rubbing action of two or more friction surfaces has the same effect in controlling the springs. The frictional type is the better of the two for the farm tractor.

It is generally necessary in the hydraulic type to replenish the liquid after every 5,000 miles with the special fluid sold for the purpose. When the arms are fitted with ball joints, these, too, must be lubricated periodically. The best form of frictional shock absorbers are those that incorporate a self-lubricating material. With these the only attention they require is after the first hundred miles, when the tension should be adjusted, this being necessary owing to the fact that the discs have bedded down. With other types it is necessary to renew the friction material from time to time.

* In the "Farmer and Settler."

# RURAL LIFE IN OTHER LANDS—VI.

By the EDITOR.*

## JOURNEYINGS IN GERMANY.

Our last halt was at Cologne, where we reviewed briefly the development of the co-operative movement in Germany and its general influence on the improvement of rural conditions in that country.

We shall now go further up the Rhine, and then on to a consideration of some recent developments in German agriculture.

### The Story of a Great River.

The Rhine has been a great commercial highway for many centuries; it is still a great traffic artery, and by a remarkable canal system it is united with the river system of Northern France on one hand and the Weser and the Elbe, two other famous German waterways, on the other. It is possible for large steamers to navigate it as far as Mannheim. From Cologne to Mayence, or, to be strictly accurate, from Bonn to Bingen, is the most historic and picturesque stretch of its long course from Switzerland to the North Sea. In that section, the most beautiful part of its whole course, ruined castles crown every romantic point and rocky crag. Its banks are clothed with sunny vineyards, and at intervals, along cliff-like margins, lateral ravines and valleys open up many delightful inland vistas. From the Seven Mountains, near Bonn to Andernach, the river seems to force its way through ranges of erupted rock, and flows through deep gorges which are a revelation of natural beauty. Historically, the story of this great stream is really the story of the western half of central Europe. In its first historical period its rich valley was probably the home of Celtic tribes whose possession was later disputed by the Teutons. Its second historical period began with the coming of the Romans who held up the advancing Teutonic tribes. Augustus, the Mussolini of the period, and his successors took good care to fortify its banks, and many Roman regiments were constantly in garrison there. Under Roman domination the Rhine valley became a great centre of civilisation and culture, which was later swamped by a Teutonic invasion. Under Charlemange, whose headquarters were at Aix-la-Chapelle, much of its ancient culture was restored. During the early middle ages the Rhine formed the most cultured province of Germany, basing its civilisation on its Roman past. It was then the classic river of Europe and has remained since the subject of romantic story and legendary lore.

To the stranger, however, if one ignores for a while its historical associations, but for which, as one lives longer on its waters or its banks one feels such a remarkable fascination, it is not difficult to think of other waterways that rival it in natural scenic splendour. Our own Hawkesbury River is, in my opinion, quite as beautiful; so, too, is the Hinchinbrook Channel, though of quite a different order, in North Queensland. The Derwent in Tasmania, shadowed by the great mass of Mount Wellington, also may fairly be thought of in comparison, not forgetting that interesting Scottish waterway, the Caledonian Canal, or that picturesque channel that leads up through the Kyles of Bute on the run from Glasgow to Ardrishaig. Our own beautiful Brisbane River at Hamilton Reach, when the setting sun is gilding the crest of the D'Aguilar Range, will also compare quite favourably with the Rhine.

### Bonn to Coblentz.

After leaving Cologne with its majestic architectural monuments and great modern bridge, we stopped again at Bonn, a well-ordered town with a world-renowned university and the birthplace of Beethoven. There, anyone musically inclined may join in a perennial argument as to the relative merits of Wagner and Beethoven. Bonn shares in the wealth of myth and legend woven around the Rhine, and Drachenfels dominates a near-by river bend. Following the river further, the Seven Mountains with their peaks, cones, and rounded ridges densely timbered were passed and then we came to Coblentz, at the confluence of the Moselle and the Rhine, the centre of an important wine trade. Its situation at the junction of two of the most picturesque rivers in Europe is one of striking beauty. We had come through great grape country and some remarkably fertile plain lands, or what we would call rich river flats. The extraordinary industry of the German vinegrower was evident in his remarkable system of terracing the steep river banks, and that reminded one so much of the hanging gardens at Thuin, where once we were billeted, near Charleroi in Belgium. The steep slopes lined with walls and arches, showing

* In a radio address from 4QG.

how the soil is held and the vines, for which Rhineland is so well famed, are carefully preserved, were eloquent of years of patient industry. It was worth the journey itself to see those wonderful vineyards set on rocky terraces with the vines bright with the green gloss of early summer amid outcropping crags decked with brownish-green and purples of moss and lichen.

Historical landmarks were everywhere; there was a story in every contour. It was at Coblentz that Julius Caesar and his legions crossed the Rhine. Other famous landmarks spoke of the history of the river down the centuries. Looking out across the stream was the great monument to William I. of Prussia. All this was very interesting, but, with what significance was regarded the great fortress of Ehrenbreitstein frowning on the river from its seemingly impregnable crag crest, with the "Stars and Stripes," the symbol of alien occupancy, floating freely in the breeze above its crenellated battlements!

Invading legions had once more crossed the Rhine at Coblentz. The Briton held the bridgehead at Cologne, and thus history was once again repeated.

## Agriculture in Germany.

Though it is a very attractive by-path, this brief excursion into history and survey of very pleasant romantic scenery, we will return to the rutted roadway of hard though not uninteresting facts and consider for a while some aspects of recent agricultural development in Germany.

At a critical period in the Great War it became apparent that, if agriculture had made no more progress in Germany than it had in Great Britain during the previous ten years, the German Empire would have been at the end of its food resources long before the end of the second year of the war; and that, as a matter of fact, the war was being fought by it just as much on the agricultural as on the military organisation of the nation. It is interesting and useful, therefore, to consider just what had been the development of agriculture in Germany, and how that development had been accomplished.

It was commonly believed then that British farming was the best in the world. Certainly, throughout the 19th century the British people led all the other nations, relatively at any rate, in agriculture. Success in food production was the criterion of good farming in the old country in the 18th century. During the 19th century Great Britain was not altogether dependent on the products of its own soil and the farmer's aim and claims were modified. He reduced his ploughed fields and extended his grazing areas. On the score of good cultivation, high yields of certain crops, live stock breeding of a very high order, and machines and implements of top-grade construction, British farming still holds the leading place; but if we return to the criterion of success accepted by our old improvers of husbandry, from whom Germany learned—the quantity of production of food from the soil—then it seems that the agricultural position in the old land would suffer in comparison with that in Germany.

## An Interesting Comparison.

An examination of available figures shows that on each hundred acres of cultivated land—that is, arable and grass lands—(excluding the poorer pastures) the British farmer feeds forty-five to fifty persons, the German feeds from seventy to seventy-five persons. (These figures are based on the estimate that, of the total "energy value" of food consumed, Great Britain imports about 60 per cent. and Germany imports 10 per cent.) The British farmer grows 15 tons of cereals, the German farmer grows 33 tons; the British farmer grows 11 tons of potatoes as against the German farmer's 55 tons. The British farmer produces 4 tons of meat, the German farmer 4¾ tons. In milk the proportion of production is 17½ tons against 28 tons, and while British beet sugar production was, until recent years, quite negligible, the German production is 2¾ tons.

The area of cultivated land in Germany has, however, decreased in later years. The agricultural population has also decreased. Rather less than more farm labour is being employed now than in former years. From those facts it may be fairly deduced that larger production in Germany is due to better farming. The soil has been better cultivated; crops more skilfully manured; plants and animals improved in type; the use of improved stock foods extended; and animal husbandry faithfully followed. Side by side with improved technical methods, improved business methods were employed and the profits of agriculture have, in turn, been used in further developing the means of production and the processes of manufacture and distribution.

**Efficient Agricultural Education.**

The chief factor in this development was unquestionably a well-organised system of agricultural education. Investigation at the research stations established the exact uses of fertilisers; trustworthy advice was supplied both personally and in various forms through the press. The German farmer, being accustomed to regimentation, soon brought his methods into line with those set down by recognised authority. Sound lessons, of course, may be taken from all this.

The German farmer produces about the same weight of cereals and potatoes per acre as the British farmer, but, as has been shown, a much greater weight per 100 acres of cultivated land. He produces about the same weight of meat and nearly twice as much milk for 100 acres of cultivated land. He feeds from seventy to seventy-five persons for 100 acres of cultivated land, while the British farmer feeds from forty to fifty.

The German farmer has attained this position in the last forty or fifty years. The soil and climate of Germany are less favourable than those of Britain. The actual methods of tillage in Britain are not inferior to the methods adopted in Germany. The difference in production is due chiefly to the circumstance that in Britain more than two-thirds of the cultivated land is now in grass, while in Germany less than one-third of cultivated land is in grass.

German land is mostly tilled by peasant owners, British land by tenants. The German depends to a great extent on women labour provided by the families of the occupiers. Wages are relatively low in Germany, and rural industries help to provide winter employment and tend to cheapen summer labour.

In Germany, in organising production, the farm-credit system is generally well adapted. Co-operation is largely resorted to. Societies have been created to provide rural leadership.

The national economic policy has also favoured the German farmer. The general effect of these agencies and influences have been the production of a very rapid improvement in the technical methods of the German farmer.

It is not meant to create the impression that the German farmer is much more skilful than the British farmer (I have taken conditions in Great Britain up to a few years ago merely for convenient comparison); he is not, nor is he likely to be. The British farmer has not lost, nor is he likely to lose, the art of good husbandry, but he has had to modify his methods for reasons that are quite obvious to any student of economics, political and otherwise. Through force of circumstance, a big proportion of ploughed land has gone to grass in British counties.

**Two Fundamentals in Rural Industry.**

In any "speed the plough" policy there must be two fundamentals, which the German has recognised—security of capital and sufficiency of labour. Though that sounds like an ordinary trite truism, it must be remembered that behind that truism there are points that are often forgotten and for which provision must be made in any policy that seeks to improve and develop the agricultural industry.

To summarise the impressions produced by a brief, and admittedly incomplete, study of progress in German agriculture, the conclusion is that in points of agricultural policy we may learn something, and from the admirable machinery—administrative, educational, and commercial—set up to lead, teach, and finance agriculturalists, we may learn much. On the other hand, from the actual methods of German farming there is relatively little to learn. In Britain, the tillage of the soil and the breeding and management of stock are as good as if not better than in Germany. The difference in production is because the plough is worked harded in Germany; and, for the farmer, the economic conditions are, or were, speaking generally, easier.

In recent years, we know, there have come revolutionary changes to agriculture in Germany, and rural industry there is faced with the social and economic problems that are common to every country in the world to-day.

# BUTTER BOXES.

## SUITABILITY OF QUEENSLAND TIMBERS.

A CONFERENCE convened by the Minister for Agriculture and Stock, Hon. H. F. Walker, was held at the Department of Agriculture and Stock recently for the purpose of discussing the type and design of butter box most suitable for Queensland requirements. Representatives from both the dairying and timber industries were invited, and those present were:—Hon. H. F. Walker (in the chair); Messrs. T. F. Plunkett, C. H. Jamieson, H. M. Russell, MM.L.A.; E. Graham, Under Secretary, C. McGrath, Supervisor of Dairying, G. H. E. Heers, Senior Grader (representing the Department of Agriculture and Stock); N. E. Hancock, Manager, Forest Service Timber Yards, E. C. Tommerup, B.Sc., Forest Assistant (representing the Forestry Service); J. H. Hancock, S. J. Cossart, C. C. Grimley, F. Haas (representing the timber interests); J. Purcell, Chairman of the Butter Board; W. T. Harris, Secretary, Queensland Co-operative Dairy Companies Association; D. Saxelby, F. W. Uhlmann (representing the Butter and Cheese Factory Managers' Association).

Apologies for non-attendance were received from Messrs. W. A. Russell, M.L.A., and J. T. Tod (Chairman, Queensland Co-operative Dairy Companies' Association).

The Minister in opening the conference welcomed the representatives of the several interests concerned and stressed the importance of both the dairying and timber industries. He mentioned that Queensland was the largest exporter of butter of any of the States of the Commonwealth, and that it required 1,320,000 boxes each year to contain the butter produced in this State, and that the sawmilling interests received approximately £127,000 each year from the dairying industry on account of the butter boxes supplied to meet trade requirements. The Minister then called attention to the agenda item that had reference to the essentials to be sought in selecting a suitable container to meet the requirements of the industry. These were listed as follows:—

(1) Freedom from timber taint.
(2) Strength of material.
(3) Effective methods of fastening.
(4) Facility of opening and closing after grading or examination of contents.
(5) Practicability of adopting a uniform box, taking into consideration the location of factories and patents involved.
(6) Suitability for packing by hand or machine.
(7) Economics—(*a*) Cost of boxes; (*b*) saving in thin timber.
(8) Attractive appearance of box.

Mr. Walker also quoted the contents of a cablegram from the Agent-General in London relative to the quality of Queensland butter on its arrival in London.

### Reported Timber Taint in Butter.

In the discussion that ensued there was unanimity of opinion as to the desirability of utilising boxes made of Queensland timber to the fullest possible extent. The reported incidence of wood taint was fully ventilated. Those present were definitely of opinion that timber suitable for butter-box purposes was available within the State, and the occurrence of wood taint flavour in butter was attributable to the omission to exercise adequate supervision in the selection of pine intended for the making of butter boxes. Provided proper precautions were taken to eliminate timber which was likely to be capable of conveying wood taint, no trouble resulted. It was mentioned that butters packed in boxes made of Queensland timber had met with success in competition with butters produced in other parts of the Dominions at many of the important dairy shows which had been held in Great Britain, New Zealand, and within the Commonwealth, thereby demonstrating that Queensland was capable of producing a timber that was eminently suitable for the making of butter containers. The conference agreed on all essentials and resolved that a committee, composed of representatives of the several interests, should be constituted to give consideration to the various details and prepare a report for discussion at a later conference.

The conference recognised that wood taint flavour was to an extent discernible in a proportion of the butter supplied to the overseas markets, but was unable to determine definitely the exact percentage affected by wood taint. It was, however, of opinion that there existed a tendency to exaggerate the proportion of affected butter, and they felt that there was a possibility that on occasion flavours other than those actually attributable to wood taint were included under that designation, which appears to be synonymous with the terms "sidey" and "toppy" used in Great Britain. However, the seriousness of there being ground for complaint against the quality of a product from this State was fully appreciated, and those assembled were confident that the action they had in view would quickly remove any foundation for complaint under the score of wood taint.

## BUSH FIRE CONTROL.

Every summer heavy losses are sustained in rural districts as a result of fire. Some of this loss is inevitable, but a large proportion might have been prevented by timely precautions on the part of individual landholders and some organised scheme of fire-fighting. With the summer months at hand, the following advice on the preventive aspect, contained in a paper read by Mr. S. Wilson, Lake Cowal, New South Wales, before a conference of farmers, may be submitted for the consideration of landholders generally.

Once a fire has started, observed the speaker, quick action to get it out is essential, but prevention is the main thing in bush fire control. As preventive measures all farms and grazing properties should have at least four furrows ploughed round all paddocks, a second set of four furrows ploughed not less than 11 yards from the first set, and all timber between these furrows burnt off prior to the grass becoming dry. A further set of plough furrows should intersect all large areas. The ploughing should be done so that it leaves the one open furrow inside the area between the two sets of ploughing, thus facilitating the burning of the buffer area by only two men.

### Formation of Local Brigades.

All landowners should form district brigades, and agree on a set of rules, such as binding themselves to at once cease the work they are at and rush off to any fire that is within a certain distance of their property, say, five to seven miles, as a minimum. For brigades to be effective the following measures should be adopted:—(1) An equipped water tank of 100 or 200 gallons should be provided for each 2,560-acre holding, or one for all smaller holdings aggregating 2,560 acres. (2) An agreement should be made that the man whose property the fire is on shall be boss and give instructions, or chaos will soon result. (3) When a fire has gained larger dimensions several bosses are required, and they should then work on an arranged plan, particularly as to where the advance trail should be.

### The Necessary Plant.

The plant should consist of a spring cart with a good horse to carry a 100-gallon tank and pump, with sufficient hose to reach 12 feet past the horse's head; also an ordinary washing tub and several buckets. A loop of rope should be tied on to the hames with the hose through it to prevent the horse treading on the hose. A motor lorry instead of a cart greatly increases expedition, which is most important. Another tank of 200 gallons on a dray for replenishing the 100-gallon tank should be provided, with two horses to pull it, as if filling from a dam or tank that is low it might get bogged. Several axes and shovels are necessary, also plenty of beaters fastened on to mallee handles or similar sticks.

Beaters made of tanned leather are the best, but have been expensive in recent years. A good useful beater can, however, be made out of a piece of saddle cloth or even half a wheat bag twitched on with wire to the handle. Beaters should be dipped in water, which should be carried in the tub already mentioned, as if dipped in the 100-gallon tank the ashes, leaves, grass, &c., off the beaters will choke the pump, and this may occur at a most critical juncture.

To make fire-lighting trailers, cut a wheat bag down the sides, then cut it crossways—with shears preferably—into strips, say, 16 to 18 inches long. Roll those up, and put a twitch of double wire round one end of the roll, leaving a small loop, and another twitch further along, so as to leave the final 6 inches loose. Dip this loose end in boiling fat. So as to be prepared, these should be made every spring, and if not required they can be replenished with fat the next year. Before using, the loose end should be split into three pieces with a tomahawk (which should always be carried by the trail-lighter at the back of his belt), and, for a handle, a double-twisted piece of No. 10 wire about 5 feet long fastened into the loop of the wire twitch. Some water should then be poured on the top end to prevent the whole trailer from catching fire, and water added whenever required. To stop the trailer burning during intervals, put a shovel of earth over it.

A bag rolled as described and damped with water, with the end saturated with kerosene, is a good substitute; the man using this should carry a gallon tin of kerosene in his hand.

# Answers to Correspondents.

## BOTANY.

*(Replies selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.)*

### *Sophora Fraseri.*

W.F. (Kingaroy)—

Your specimen is a native shrub of the legume family (*Leguminosae—Sophora Fraseri*). It occurs in a number of places in South-eastern Queensland, but we cannot say it is anywhere very abundant. Species of Sophora in other parts of the world are said to contain poisonous properties which are very powerful and this is the first instance of the plant coming under our notice, but owing to the suspicious nature of other members of the genus it would be as well to get rid of it from paddocks where it is growing.

### Melilot or "Hexham Scent."

E.T.F. (Sandy Creek, Kilcoy—

The taller growing plant is *Meli'otus parviflora*, the Melilot or Hexham Scent. This plant is fairly common in Queensland, comes up with the winter or spring rains. It is widely spread as a weed in most warm temperate countries and has some value as a fodder though its peculiar scent is transferred to the cream of dairy cows that are fed on it. This plant was boomed some years ago as King Island Melilot, and in sandy soils, where ordinary lucerne will not grow, has some value for fattening purposes.

### Creek Cherries.

G.C.F. (Toobanna, Ingham Line)—

Your specimen is *Eugenia tierneyana*. Several species of Eugenia grow along creek banks in Queensland and are commonly known as Creek Cherries. The one you sent is quite common in Northern Queensland, and we have had no reports about it causing trouble in any way. Most of the species of Eugenia yield edible, rather acid fruits. Unless, however, one knows very definitely the properties of these plants it is very difficult to say much about them, **owing to their close relationship to the Finger Cherry (Rhodomyrtus macrocarpa), known to cause blindness in persons eating it.**

### Sand-Binding Grasses.

INQUIRER (Brisbane)—

It is always a difficult matter to get sand-binding grasses for the tropics. There are, however, several native grasses that grow in North Queensland, such as *Stenotaphrum subulatum, Spinifex hirsutus, Lepturus repens*, and *Thuarea sarmentosa* and others that might be obtained from neighbouring islands and planted at Saibai. These sand-binding grasses are usually not propagated by seeds but by roots. We think Panicum muticum is also worthy of trial, but do not know how this would grow in a moving sand dune. However, a bag of roots could be obtained from Cairns, or from the Director, Botanic Gardens, Rockhampton.

### Central Queensland Plants Identified.

M.L.F. (Dalma, via Rockhampton)—

Your specimens are:—

1. *Usnea* sp. A lichen. Sometimes called Old Man's Beard.
2. *Alphitonia excelsa*. Red Ash. Family Rhamnaceae. Cattle and horses are fond of the leaves and the tree is a valuable fodder species.
3. *Myrtus Hi lii*. (?) Ironwood. Family Myrtaceae.
4. *Dodonaea viscosa*. Wild Hops or Hop Bush. Family Sapindaceae.
6. Doubtful. Could you watch the tree for flowers and send down specimen twigs about 6 to 8 inches long? You could dry the specimens for a few days by pressing them in newspaper three or four times in the course of one week.

The piece of bark is of little value in most cases for determining species. Could you not obtain a leaf-bearing twig?

**Dusky Coral Pea.**

S.R.E. (Esk)—

Your specimen is *Kennedya rubicunda*, the Dusky Coral Pea, a rather handsome climber of the family Leguminosae, found in all the Eastern States.

**Daisy Bush.**

E.R. (Lamington, via Beaudesert)—

Your specimen is *Olearia nernstii*, a species of Daisy Bush found growing in several mountain localities in South-eastern Queensland. It is very closely allied to the garden Asters and by some botanists the genus Olearia is as a matter of fact not regarded as distinct from Aster. The plant is worthy of cultivation as an ornamental shrub and we think could be grown quite easily and successfully from seeds.

**Curled Dock.**

F.B. (Goomeri)—

Your specimen is the Curled Dock (*Rumex crispus*), a common European weed naturalised in most warm temperate countries. It is often seen about Brisbane as a weed of waste places, but is most abundant on the Darling Downs, where it is somewhat of a pest on the wheat fields. Docks as a rule are generally regarded as having little or no fodder value.

**Burr Trefoil.**

J.K. (Spring Creek, Stanthorpe)—

Your specimen is *Medicago denticulata*, most commonly known in Queensland and New South Wales as "Trefoil" or "Burr Trefoil." It is a native of Southern Europe, but now occurs in the pasture lands of most of the warm temperate countries of the globe. It is one of the most abundant plants growing in Southern Queensland and New South Wales, particularly in the wheat belts, and has largely displaced the original native pastures. It is a comparatively short lived plant, generally commences growth in the autumn, seeding about September or October. When in seed the plant bears a number of burr-like pods. These, however, are eaten by sheep and are most nutritious. Although not so palatable as the clovers and some herbage, it is fairly nutritious and is eaten readily by stock.

**Twin Leaf.**

T.H.M. (Columboola)—

The specimen is a species of Twin Leaf, botanically *Zygophyllum apiculatum*. About half a dozen species of the genus Zygophyllum occur in Australia and all probably possess similar properties. They have been accused, both here and in the other States, of being poisonous to stock, but not on very definite grounds. Though the present species is extraordinarily abundant in parts of Queensland, and during times of drought may be the only green seen, we do not remember having seen stock eat it to any extent. The late Mr. J. H. Maiden, however, writing in the "Agricultural Gazette" of New South Wales (vol. xi., p. 24) quoted Mr. Max Koch, a well-known botanical collector, as stating, about Zygophyllums, that "they form, in a good season like the present one, a most valuable adjunct to the winter pasture, providing succulent, if not very nutritious, fodder for both cattle and sheep. My horse is always ready to make the best use of a short halt by feeding on the plants indiscriminately and with a relish, and the cropped appearance of a neighbouring paddock which is stocked with sheep is ample proof of the usefulness of these plants. The foliage being of a watery nature, enables the sheep to do without a drink during the winter months as long as the herbs last, and to feed in the more remote portions of the paddocks. This is a matter of great advantage to the sheep-farmer, for the pasture near the wells (Mr. Koch is speaking of the dry country in the interior—J.H.M.), which is more or less heavily punished during the ever-recurring spells of dry weather, has an opportunity to recover. They mature seed in abundance, and perpetuate their kind regularly, provided seasonable rains fall at the end of February or the beginning of March." This would seem to indicate that the plants are not poisonous, but have a definite fodder value.

**Lasiandra.**

T.H.B. (East Barron, via Atherton, N.Q.)—

Your specimen is *Pleuroma splendens*, generally known by its other generic name of *Lasiandra*. It is a native of Brazil and belongs to the family Melastomaceae. We have several native shrubs of the family Melastomaceae, one or two of them with rather pretty flowers but not quite so large and showy as the garden Lasiandra.

**Johnson Grass.**

J.C. (Childers)—

Johnson Grass is poisonous to stock, especially in its more luxuriant stages, although very few deaths have been reported from it in Queensland. The only ones have been occasional losses among dairy cattle. Like Soudan Grass, Imphee, and other plants of the Sorghum family, Johnson Grass possesses a prussic-acid yielding glucoside, and if eaten in quantity may cause trouble. The symptoms you described, however, do not tally with poisoning by this grass, for when this does occur death is very rapid.

**"Mexican Clover"—Common Flax.**

A.C.R. (Bli Bli, via Nambour)—

1. *Richardsonia scabra*, a native of tropical America, but now common as a naturalised weed in most warm countries. It has been boomed in America as a fodder under the name of Mexican clover, but does not, of course, belong to the true clovers, or to the legumes at all, but to a totally different family, the Rubiaceae. Our experience in Queensland generally is that stock rarely touch it, though we have had one or two reports to the contrary.
2. A plant with blue flowers, is the common flax or linseed, *Linum usitatissimum*. It has apparently come up from some linseed that has been spilt or as an impurity in agricultural seed.

**Roughage.**

The Agricultural Chemist, Mr. J. C. Brünnich, in answer to a correspondent, advises as follows:—

"Under the term roughage we include all forms of dry grasses, chiefly found in the form of stubble after seeds have all been shed. This stubble is practically the only food available at the end of winter in many districts. The nitrogen contents are generally very low, as such roughage contains, as a rule, only from 1 to 3 or 4 per cent. of protein, whereas the green grass may contain as much as 15 to 18 per cent. of protein.

"The use of licks made from salt and lime phosphate, either in the form of bonemeal or finely crushed Nauru phosphate, not only supplies the animal with the absolutely necessary amounts of lime and phosphorus, but also greatly increases the digestive powers and appetite of the animal, and a larger amount of the poor roughage can be eaten and digested, which is of utmost importance when only such poor quality of fodder is available. For general purposes we recommend simply a mixture of one part of ordinary butcher's salt and two parts of finely-crushed Nauru phosphate. The great trouble is to make the animals consume a sufficient amount of this lick, as sheep require about 3 oz. per week per head, and cattle at least 1 lb. per week. The addition of a little molasses or some sort of meal is generally recommended to make the lick more palatable."

## PIG RAISING.

*(Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.)*

**Points in Pig Breeding.**

M.V.I. (Biloela)—

As a general rule, stud boars and breeding sows are productive for about seven years of their life. Neither male nor female should be used for breeding until they are at least ten months old, and if they are twelve months old (especially in the case of the sow) so much the better. Young boars may be given a sow or two when from nine to ten months old, but should not

be put to active service under one year old. Both boar and sow should be culled after passing eight years of age, while if for any reason they become unproductive before reaching that age, it will pay to get rid of them. Both are in their prime when between three and four years old, though many boars are reliable stock getters and many sows dependable mothers for a longer period than eight years.

Generally, however, the teeth wear down and become uneven after eight years of age and the animal is not able to forage to the same advantage as younger stock, while in most cases as the stock increase in age they become heavier and less active and the sows overlie a good many of their young ones.

It is preferable, if at all possible, to have boar and sow of similar age and size, that is to say, it is inadvisable to mate an aged and heavy boar to young sows, as accidents frequently happen from following such a practice and it is inadvisable to have a very young boar for mating with aged sows by reason of the fact that very often animals of varying ages fight a good deal and aged sows will often punish a young boar to such an extent as to practically ruin him for service.

Aged animals also very often become lethargic and disinclined to breed though they are very strong and determined, and if permitted to feed at the same trough with younger stock will cause a good deal of trouble and losses in fighting among themselves.

Dealing with the question of mating the Tamworth boar with Berkshire sows versus the mating of Berkshire boar with Tamworth sows, it would be well to add that there is no hard and fast rule to follow in the mating of various breeds for the production of pork and bacon pigs, nor does it follow that the Tamworth-Berkshire cross is the only one advised. Experience proves it is largely a matter of individuality of the various animals used, together with any particular fancy a breeder may have for one or other of the types commonly used. It is often a difficult problem to pick and choose in the matter of selection of breeding stock, for in many instances there is a shortage of one or other of the breeds and a liberal supply of others. Usually it is possible to secure reasonably good Berkshire sows in districts where Tamworth sows are in very short supply, and in these cases we recommend the use of a really good Tamworth boar; in any case the Tamworth boar is a reliable stud sire and is frequently more active and dependable than the Berkshire.

On the other hand a first class Berkshire boar mates to advantage with selected sows of the Tamworth and first class Tamworth-Berkshire type, the latter sows being in great request in most districts where pig-raising is carried on.

The same observations apply in the case of breeds other than the Tamworth and Berkshire; that is to say, a Berkshire boar mated to a Large Black sow should be productive of good results, the sow being large and roomy and of a type noted for prolificacy and heavy milk production.

Other of the larger breeds like the Gloucester Old Spot, Duroc-Jersey, and the Chester White may be used in much the same way, while under a proper system of feeding and management, purebred pigs of these breeds may profitably be produced as good pork and bacon pigs. The Yorkshire types, being of more medium build, are suited for porkers and light bacon pigs.

It does not pay to castrate aged boars with a view to fattening them for market, for the price they realise would not pay for the feed and expense incurred in their handling. If feed is plentiful and reasonable in price, old sows may be disposed of for small goods purpose, but these matters need careful study.

## Points in Pig Feeding.

J. de V. (Mapleton)—

It is quite evident the illness from which the pigs suffered had as its primary cause improper diet and unbalanced rations, followed by inflammation of the stomach and intestines and severe constipation. It is possible also that some of the maize was mouldy and rotten, and that the troughs had not received a necessary daily cleansing.

Pigs fed on unbalanced rations, like a ration consisting almost entirely of boiled maize, would naturally have a craving for flesh-forming materials, minerals, and vitamins, and would in the absence of these resort to eating sand and soil, and possibly indigestible fibrous matter. It is very unkind and unprofitable to lock animals up in bare dusty pens or yards and feed them almost entirely on boiled maize, good and all as that food is when properly balanced with flesh formers, minerals, &c. In fact there is no profit at all in forcing pigs to consume large quantities of comparatively high-priced food and refusing them the more bulky succulent nutritious green foods. These green foods—lucerne, field peas, green corn stalks, sorghums, &c.—are all cheap and efficient foods when fed with maize and other concentrated foods, plus, of course, an abundant supply of clean drinking water, from an absence of which pigs may greatly suffer. There is no reason at all why pigs should suffer from such ills if they are properly fed and cared for.

## Rice Meal for Pigs.

J.J.M. (Cinnabar)—

According to Henry and Morrison's "Feeds and Feeding," rice bran and rice polish, both products of the same class as rice meal, though not so concentrated, are economical foods for pigs. One hundred pounds of rice polish being equal to 133 lb. of corn and 100 lb. of rice bran equalling 112 lb. of corn. Rice meal and similar rice products are, however, relatively poor in crude protein and fat, hence it is not a good food from a purely growth point of view. The meal is a by-product from the manufacturing process of commercial rice; the small, broken, stained, and surplus grain is also ground into a meal and is doubtless mixed with the by-products in milling. It has a good feeding value, when fed with milk, maize, and other cereal meals and green foods. It is usually valued at about the same as pollard and is sold in bags containing 5 to 7 bushels (approximately 100 to 140 lb.).

Recent samples of rice meal analysed by the Department of Agriculture and Stock, Brisbane, gave the following result:—

| | |
|---|---|
| Moisture .. .. .. .. | 10.5 per cent. |
| Crude protein .. .. .. | 12.6 per cent. |
| Crude fat .. .. .. | 13.9 per cent. |
| Crude fibre .. .. .. | 8.9 per cent. |
| Crude ash .. .. .. | 8.8 per cent. |

Pollard usually carries about 10.5 per cent. of moisture, about 15 per cent. of crude protein, 3.5 per cent. of crude fat, 6 per cent. of crude fibre, and 3 per cent. crude ash.

It will be seen therefore that rice meal carries less protein than pollard, but has a higher fat, fibre, and ash content, this indicating that it would need to be fed in conjunction with foods carrying more protein like milk, grain, lucerne, or lucerne chaff (soaked), peas, or pea meal, or even with a percentage of pollard if milk and green foods were in short supply. Where pigs do not do well on rice meal it would pay to reduce the supply down to a minimum and increase the supply of other foods like maize, for rice meal does not appear to be as palateable or as appetising as maize.

Try soaking the rice meal in milk or milk and water and if possible add a percentage of lucerne chaff. The addition of a very small percentage of salt and bone meal would also prove of considerable advantage, and in each of these cases the cost of feeding would not be materially increased, especially if a good supply of green lucerne or other green stuff could be worked in. It is useless trying to force pigs to consume meals, &c., on which they do not develop satisfactorily, hence if these suggestions do not lead to improvement we would recommend cutting out the rice meal and using pollard, barley meal, or commercial pig meals.

# General Notes.

### Canegrowers' Organisations.

An Order in Council and Regulations have now been passed under "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1928*" setting out definitely the powers and functions of the Queensland Cane Growers' Council, District Cane Growers' Executives, and Mill Suppliers' Committees.

### Banana Beetle Borer—Proclamation Rescinded.

On the 22nd September, 1927, a Proclamation was issued prohibiting the introduction of any banana suckers into the Wolvi district, which was then free from beetle borer infestation. On a petition being received from growers in the Wahpunga district and upon the recommendation of the Wolvi L.P.A., the Proclamation has been rescinded, thus allowing banana suckers to be introduced from outside areas. This prohibition has been lifted on account of the Wolvi district having become infested with beetle borers.

### The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Theatre on Monday, 30th September, 1929.

The President, Professor J. P. Lowson, M.A., M.D., was in the chair.

Mr. H. J. G. Hines, B.Sc., was elected to ordinary membership.

Professor E. J. Goddard, B.A., D.Sc., delivered a lecture entitled "Science and Agriculture in Java." A vote of thanks was carried on the motion of Dr. W. H. Bryan, M.C., seconded by the President.

### Kikuyu Grass in Paspalum Pasture.

Kikuyu grass is a useful plant to work in amongst paspalum, or to plant in ploughed paspalum areas, as it will not only hold its own, but in most cases will choke out the other grass. Kikuyu is more drought resistant, and produces more feed during winter months than paspalum, although it must be remembered that it is primarily a summer grower. It does not form seed, and consequently roots have to be planted.

The best time to plant is during the spring. Where it is impossible to plough the roots in, such as on hillsides or in stony land, use a mattock or hoe, completely burying the roots 1 to 2 inches deep, so as to prevent stock from pulling them out of the ground during the early stages of growth.

### The Silent Men.

There are many men of great ability who are not good talkers and the world owes much to them. We read the other day of a director, concerning whom the president said, 'His words are few, but his judgments were wise and influential.' We have known cases where the most voluble members of a committee or board would discuss a matter for hours, but in the end the decision nearly always rested upon the opinion of one or two men slow of speech, but of remarkably sane and well-balanced judgment. The idea that fluency must necessarily mean great mentality is an erroneous one; the thinker is often slow of speech and he is not apt to shine in society. Youth finds it difficult sometimes to realise this, and is apt to pin its faith to the man with the golden tongue, forgetting that intellect and heart are of much greater importance than facility in speech.—The "New Outlook."

### The New Pace in Industry.

I am aware that in England we have some factories managed as well as any in the world; but I am afraid it is undoubtedly true that there is in this country a larger mass of cynicism regarding scientific management than there is anywhere else in the world. There is a larger proportion of men in charge of businesses who do not recognise the need for any intellectual preparation for the job of management. There is a larger proportion of people who think that just because a man is his father's son he can manage the business which his father managed. The fact is that the pace of industry is very rapidly increasing, and the standard of efficiency needed for success is rapidly rising. The British are second to none in technical matters, but they have been inclined to neglect the questions of administration and organisation.—Mr. Seebohm Rountree, in the "Yorkshire Post."

### When Feeding Sorghum.

Sorghum should not be fed to stock until it comes into head; if fed prior to this stage there is a danger of what is commonly known as sorghum poisoning. The greatest yield of green fodder is obtained when the seed has formed, but is still in the milky stage. At this stage the crop is very palatable and digestible.

Sorghum poisoning is of fairly common occurrence in Australia, and has also been reported from other countries, but it is only necessary to adopt certain precautions to avoid loss. The poisonous substance gradually diminishes as the plants become old, and entirely disappears by the time the seed is formed. Stock should not be allowed to eat young sorghum, especially if it is wilted through hot, dry weather. Stunted sorghum may also cause death, and immature sorghum which has been frosted is dangerous. The mature sorghum is harmless, and can be fed with perfect safety.

### A Temperature Tail—The Curl of the Pig's Appendage.

Owners of Berkshire pigs in the United States declare that they can tell when it is going to be a cold windy month by the curl of the pigs' tails. One farmer avers he has forecast weather for years by simply watching the pigs' tails. This is what he says:—

When the tail straightens out, you may depend on colder weather, because the Berkshire is reaching out for the heat. In other words, the Berkshire figures that the longer his tail the more radiation he gets, whereas a tightly curled tail gets the sun only a few hours a day. Naturally when a pig's tail is curled up he is not getting, nor does he need, the warming rays of the sun. I suppose this is the same with other breeds. Take it from me, says the writer, a Berkshire tail works the same as a thermostat. It contracts and expands according to the temperature.

### Passion Fruit Yields.

"It is being asserted in some quarters," writes the departmental Fruit Instructor located on the North Coast (New South Wales), "that a yield of 200 bushel cases of passion fruit per acre is a fair average yield under North Coast conditions. This estimate is greatly exaggerated and is, no doubt, based on the fact that some five years ago yields of that quantity were obtained in the Tweed River valley. It is most unreasonable, however, to assume that what can be achieved in that particular district is also possible anywhere on the North Coast, from Kempsey to the Tweed Heads. Moreover, in recent years, brown spot and woodiness have substantially reduced yields, and the grower who to-day is harvesting 140 bushel cases per acre should be satisfied that he is obtaining a fair average crop. Even to obtain that quantity, he will need to have a fair knowledge of proper cultural practices and disease control measures, and, in addition, be favoured with a normal season."

### Laymen as Research Workers.

The layman is often deterred from serious application to any branch of science by the length of the road he thinks it will be necessary to travel before becoming qualified for research. If it were essential to master a subject before attempting to contribute to its advancement by original work, none of us could hope to become more than industrious seekers after omniscience within a restricted field, said Professor A. C. Seward, F.R.S., speaking at the annual British Association meeting. Anyone of average intelligence, provided he or she has the driving force born of enthusiasm and the faculty of taking pains, is capable of making valuable contributions to knowledge in some department of scientific inquiry. Amateurs have taken an honourable and productive part in advancing geological and botanical knowledge; they have an advantage over professional teachers in that they are free to concentrate their energies where preference leads them. Moreover, laymen are more fortunate than professional men of science, who are expected to be able to answer all questions relating to the subject they profess, in not being expected to know more than they know.

### Scours in Calves—Method of Treatment.

Scours is one of the commonest maladies affecting artificially-reared calves. It is almost always caused by careless feeding—of milk that is too cold, not quite fresh, or contaminated by the oganisms which cause scours, by too large a feed, or by too rapid a change from one class of food to another. Primarily, it is an evidence of

indigestion and should be checked before it reaches the stage known as "white scours" or the more dreaded "blood scours."

The best measures to adopt are—

1. Reduce the quantity of milk per feed.

2. Look for the cause of the trouble.

3. Heat milk (for affected animals at least) to a temperature of 180 deg. Fahr. for ten minutes and keep in perfectly clean surroundings.

4. Give the calf about 2 oz. of good castor oil (cold drawn) to remove the corrupt and undigested material from its stomach as soon as possible.

### "What Was He Worth?"

"'What was he worth?' is no uncommon question after a man's death, and such a question is a painful tribute to the commercialism of to-day. If a man is worth no more than what he left, he is worth nothing," says the "Expository Times." "A man is worth what he is, not what he has; and that is true both of this world and of that which is to come. While he lives he may win and lose everything but one—his own personality. That is always his: ultimately it is all that is his. In that lies his worth—not in the abundance of the things which he possesses and can lose. And when he dies, he loses what he has, but he remains what he is. He who is unjust will be unjust still; he who is holy will be holy still; but he who is wealthy will be wealthy no more. When a man is said to be worth so much, let us ask, To whom? Who was the better for what he was worth? Was even he himself the better for it, or was he only the richer? Did his presence lighten any darkness, cheer any loneliness? Was any heart the sorer for his passing? Unless he was a worthy man, unless, that is, there was something in him we could worship—for worship is tribute to worth—he was worth nothing, though he had millions. The day is not yet come—will it ever come?—when inner worth is rewarded with its corresponding share of the world's good things, its honour, fame, and gold. There may be some world where worth and wages invariably and accurately correspond, but assuredly it is not ours."

### A Story of Steady Progress.

Thus the "Queensland Producer":—The annual report of the Under Secretary for Agriculture (Mr. E. Graham) was tabled in the Legislative Assembly recently. Mr. Graham is to be congratulated upon the comprehensive review of the State's primary industries.

Mr. Graham makes no extravagant statements regarding Queensland's primary production. He indicates the steady progress that has been made in the various sections of agricultural industries.

The wheat yield showed a decrease on the previous year; sugar-cane production was well maintained; cotton showed a decrease due to the uncertainty as to the attitude of the Federal Government towards the industry; butter production was a record—a tribute to the magnificent work performed by the co-operative associations and the efficient organisation of the marketing end of the industry; steady progress has been maintained in the pig industry; the rapid expansion of the poultry industry has been maintained.

One feature of the year's operations was the improvement in the quality of fruit. There was a decrease in the number of cattle and horses, and an increase in the number of sheep.

Mr. Graham's story is one of steady progress, and indicates the wide range of Queensland's agricultural production.

### Blowfly Trouble in the Central West.

The Minister for Agriculture and Stock, Mr. H. F. Walker, M.L.A., informed the Press recently that upon his being advised of a serious outbreak of blowfly attack in the Central West, he had arranged that Mr. J. Carew, Senior Instructor in Sheep and Wool, should investigate the methods adopted by pastoralists in combating this pest, and also to advise, in all necessary cases, as to the best way of dealing with it.

Mr. Carew spent some time in the Western country and discussed with a number of pastoralists their methods of combating the difficulty. Some flock owners picked out all affected sheep for treatment. This treatment consisted of crutching, cleaning, and swabbing the infected parts. The remainder of the flock were then jetted with a proprietary powder dip used in liquid form.

In one instance, Mr. Carew inspected ewes that had been jetted four weeks previously with this mixture, at the rate of two packets to fifty gallons of water, applied by power at a pressure of about 150 lb. to the square inch. The ewes had been crutched in May, and no stricken sheep were noticeable in this particular flock.

Generally, Mr. Carew found that jetting gives more protection than, probably, any other method, provided that the mixture is sufficiently strong and properly applied with enough force to reach the skin. The real jetting objective is to ensure that the fluid reaches the base of the wool fibre and the skin. It was found that in some cases where this contact was not effected the jetting fluid did not penetrate to the parts most likely to be affected by fly.

Both in the Longreach and Barcaldine districts it appeared that the intensity of the attack had abated, and that the owners generally were getting the pest well under control, although some sheep had been lost.

## Millet as a Catch Crop.

Millet is perhaps the quickest growing of all plants cultivated on the farm, provided it finds suitable weather conditions, and its utility as a catch crop is becoming increasingly recognised.

Millet may be grown for hay, green fodder, or to be fed off by stock—it is useful for feeding to all classes of stock and poultry. The crop may be fed off green, and then allowed to produce growth for hay. Where it is fed off the stubble should be harrowed to loosen the soil and conserve the moisture, and in this manner a good second growth is usually obtained. Owing to its sturdy habit, millet has been found a splendid crop to grow on foul land to get rid of the weeds.

The most useful varieties are Japanese, Hungarian, Manchurian (white and yellow), White French, and Pearl, and of these Japanese is by far the most grown. Japanese is about the best stooler of all the millets; Hungarian is useful as a hay variety, but is not a good stooler and will not stand a dry weather pinch like Japanese; while where grain is required the Manchurian varieties will be found the most prolific.

Millet obtains its nourishment chiefly from the surface soil, and it is good farm practice to stimulate the growth with readily assimilable fertilisers or rotted farm manure; the fertilisers are best harrowed in, and the farmyard manure applied before ploughing.

From 8 lb. to 12 lb. seed per acre is required, according to the fertility of the land. Broadcasting is the usual method of sowing, but for grain production or silage drilling is advantageous. Where possible, sowing should be carried out after rains or when the soil is moist, to give the crop a start.

## Water for Bees.

The bee-farmer should generally endeavour, when selecting a site for his apiary, to get near a permanent water supply, for bees require an ample supply of good water, especially during the hot weather. If there is neglect in making provision for water near the apiary, there is considerable wastage of energy on the part of the bees in searching for a supply, and in carrying it a long distance.

It is not a very difficult matter to provide a water supply even if containers have to be used. A container offering a good surface of water is preferable, and cork floats can be put in the vessel to prevent the bees from being drowned. Another method is to bank sand in each side of the vessel, and place a cover over the water, which is in the centre; the bees will obtain the water from the moist sand. It is important that the water supply be kept fresh. A supply of water in the apiary grounds is especially advisable where bees are kept in towns, so as to get the bees into the habit of obtaining water at home, and not searching about the neighbourhood for a supply.

There are many points to be considered in starting an apiary, particularly when bee-keeping is to be carried out on commercial lines. As in other activities, the start is all-important. Five well-hived colonies containing a fair breed of bees will, with ordinary attention, equal thirty of the "kept any way" sort, so far as production is concerned. It is quality, not number, that counts; and the beginner's first aim should be to keep bees the right way.

A very comfortable living can be made from apiculture, providing the apiarist will properly qualify himself to become a producer. The three main things are experience, locality, and energy. Small apiaries can be profitably worked as a side-line with other industries, providing time can be found for ordinary attention during the season.

### Music in the Air.

A series of tests with the most modern creations of radio engineering from all parts of the world have been carried out by the principals of Paling and Co., of Queen street, Brisbane, in an endeavour to obtain radio sets that may be relied on to give best performance and utmost satisfaction. The result of this extensive research has been to bring Majestic and Victoradio to Queensland, Palings, of course, being Queensland agents. From every angle Majestic and Victoradio are said to represent the last word in radio design and construction. The cabinet work on all models is most artistic, the finish to all appearances perfect and the reproduction practically faultless. Both electric and battery sets are included, and, perhaps, the most interesting of all are the combination radio sets and phonographs—both Majestic and Victor. As radio sets they are very powerful and being equipped with the latest type of dynamic speakers, bring in all Australian programmes—including short wave stations —with unusual clarity and purity of tone. As far as the phonograph is concerned, one has only to play one record to realise that it is a machine of special quality. A button on the front of the instrument controls both the volume for the radio and phonograph, and, especially when the phonograph only is being played, results in a class of reproduction one rarely hears.

Both these combination instruments are beautifully designed, and being finished in perfectly matched walnut or mahogony, have the appearance of excellent pieces of furniture that would find a place in any drawing-room, no matter how elaborately furnished. Other Majestic and Victor models are also beautifully made and most efficient.

### Marketing of Tomatoes.

Some time ago notice was given by the Committee of Direction of its intention to issue a Direction for the marketing of tomatoes. As a consequence, a petition was received asking for a ballot to decide whether or not such Direction should operate, and Regulations under the Fruit Marketing Organisation Acts were issued on the 31st August last, describing the procedure which should be adopted in the holding of the necessary ballot. Those entitled to vote were any growers of tomatoes within the District bordered on the north by Nambour, on the west by Rosewood, on the south by the New South Wales border, and on the east by the Pacific Ocean. The grower had to declare that he expected to have tomatoes for sale on a wholesale basis between the 15th September and 15th December, 1929. The Direction the growers had to vote on was:—

(*a*) All tomatoes to which the Direction applies shall be subject to inspection by the Committee;

(*b*) All mature tomatoes may be marketed by the growers;

(*c*) Tomatoes which are not mature may be diverted by the Committee to the factories; and

(*d*) All tomatoes are to be dealt with and handled by the loaders of the Committee of Direction, but this did not mean that all tomatoes would be sold by the Committee.

Briefly the object of the Direction is to deal with immature tomatoes, the intention being that growers themselves should be able to market mature fruit.

The poll was duly conducted and the result was that 147 voted for the Direction and 85 voted against. As this was more than the three-fifths majority required under the Act, the proposed control became operative.

### Australian Wildflowers.

In view of the recent discussion on the ways and means of stimulating interest in Australian native flora, it is pleasant to note among the publications of the Shell Oil Company an attractive brochure on Australian Wildflowers, "issued gratis to the motoring public of the Commonwealth."

In the preface of this little book is expressed the desire of the company to stimulate public interest in our abundant natural flora. Although there are technical works on the subject for the botanist and many delightful reproductions of specimens on canvas, the need has long been felt for some non-technical descriptive work that may be both interesting and instructive to the general public, and may serve at the same time as a practical handbook to those who, taking trips into the country or living there, have the opportunity of studying the flora first hand.

Authoritative information on the parts of the country where the different varieties of flowers may be found is given in the small volume which contains some fine coloured plates of popular favourites.

More important still is the direct appeal it makes to the public to protect the wildflowers of this country. The need of such an appeal has been increasingly felt with the wanton destruction so much in evidence each season in the nearer country districts.

The Victorian Government Pomologist, Mr. E. E. Pescott, speaking at the Constitutional Club on 16th August, 1929, called attention to the manner in which Australian flora is slowly but surely disappearing.

By this publication the Shell Oil Company is helping to stimulate a greater public pride in the beauty of the countryside—especially so in view of its free distribution. The motorist, on applying for the book, should send in with his application to the Shell Company the registration number of his car.

## Cleanliness in the Milking Shed.

Absolute cleanliness in connection with the operation of milking is of the greatest importance. The cow having been bailed or tied up, the milker should wipe the udder with a damp cloth; this is preferable to brushing, which only causes the dirt to float in the atmosphere and subsequently to drop into the milk bucket. A separate cloth should be used by each milker, and should be kept thoroughly clean and sweet —a smelly cloth is a source of contamination.

Where gravitation water is not available, a good plan is to have, say, two oil drums, into each of which is fixed a small tap. These drums should be fixed to the posts or walls and filled up with water, a system thus being installed that allows the milker to have clean water in which to wash his or her hands. Very often one finds basins of water used, but as this is probably not changed during the whole milking operation it becomes a thick soup containing myriads of organisms, and therefore a source of contamination instead of benefit. After the milking of each cow the milker should wash his hands in clean water, and dry them; if this is not done there may be bacteria in the liquid on the hands that will gain access to the milk in the bucket.

Dry milking versus wet milking is often a debated point, but the practice of drawing a little milk into the bucket and dipping the fingers therein is undoubtedly most insanitary. A good plan is to touch each teat with a little vaseline, which prevents friction, and also prevents cracks on the teats.

Any time occupied in washing the hands is made up eventually by reason of the water's invigorating effect on the hands and wrists of the milker. Moreover, as every dairyman knows, the more actively the milking is done the more the activity of the milk-secreting cells is stimulated, hence more milk of better quality. Clean milking also tends to lessen the risk of transmitting disease from cow to cow.

Not only should every process in connection with the milk itself be cleanly, but cow-bails should be so constructed as to allow of easy cleansing, and should be frequently lime-washed as well as cleaned daily.

## Staff Changes and Appointments.

Mr. G. Bates has been appointed Field Assistant, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock.

Constable C. F. Robson, of Mitchell, has been appointed an Acting Inspector under the Diseases in Stock Act as from the 19th October, 1929.

Mr. S. C. Allan, of Cloncurry, has been appointed an Inspector under the Brands Act of 1915.

Messrs. H. W. Kerr and E. J. R. Barke have been appointed Inspectors under the Fertilisers Acts.

Constable V. B. Saal, of Tannymorel, has been appointed an Inspector under the Slaughtering Act.

Mr. J. P. Ward, Clerk, Agricultural Bank, has been appointed an Inspector, Agricultural Bank, as from the 2nd October, 1929.

Mr. S. R. Frankcom, of Tamaree, has been appointed an Honorary Inspector under the Diseases in Plants Acts, as from the 26th October, 1929, vice Mr. T. Jones, resigned.

Mr. J. C. Pryde has been appointed a Temporary Inspector under and for the purposes of the Diseases in Stock Act for a further period from 29th September to 2nd November, 1929.

Mr. P. J. Short has been appointed a Temporary Inspector under and for the purposes of the Diseases in Stock Act for the period from 12th November to 12th December, 1929.

Mr. J. H. Smith M.Sc. (Agric.), Assistant Entomologist, Cairns, has now been appointed Entomologist, Department of Agriculture and Stock, and Mr. W. A. T. Summerville, B.Sc., Assistant to Entomologist, Brisbane, has been appointed Assistant Entomologist, Department of Agriculture and Stock.

Mr. W. B. Horneman, Inspector under the Dairy Produce Act, at present attached to Nanango, has been transferred to Rosewood; Mr. E. R. Boyd, Inspector under the Dairy Produce Act, has been attached to the Nanango district; Mr. A. Hossack, Inspector under the Dairy Produce Act, at present attached to the Herd Testing Staff, Brisbane, has been transferred to Gatton; and Mr. S. E. Pegg, Inspector under the Dairy Produce Act, has been attached to the Herd Testing Staff.

### Wheat on the Downs.

The Minister for Agriculture (Hon. H. F. Walker) has received from Mr. J. J. Kemp, a well known farmer of Junabee, a statement regarding the prospects of wheat growing on the Darling Downs, from which the following note is taken:—

> "I have no hesitation in saying that wheat can be grown successfully on the Downs, as I have been growing wheat over thirty years, and during that time have had only one failure, that was in 1901-2. In normal years we get a return of 8 to 10 bags per acre, good years to 13 bags. In 1916, which was a very dry year, on ground that was fallowed we got a return of 8 bags per acre; that proves if fallowing were done more extensively that there would be no failures of wheat. In 1923, another dry year with no fallow, we got a return of 16 bushels per acre. In 1926, a drought year, we had to feed most of the crop to stock and we got 12 bushels from what we harvested. My experience is to work the ground as early as possible after taking off the crop so as to conserve as much moisture as possible for the next crop. No use taking plough in the paddock when the drill should be there, as it is only courting a poor crop or failure. We have as good wheat land as can be found anywhere. All it wants is working early and well to give a good return. If this were done I venture to say that there would be few failures in regard to growing wheat."

Commenting on this Mr. Walker remarked that as indicative of the confidence which results from stability and mutual agreement between those concerned in industry, he had received an intimation from one of the country millers of his willingness to erect substantial stores at his mill entirely at his own expense, conditional on a small area of Crown land controlled by the Railway Department being made available to him for this purpose. The miller in question offered to have these stores erected immediately, and if possible, in time for the safe housing and storing of portion of the coming season's crop. Mr. Walker added that he was looking into the matter with the Department concerned. Obviously it would be preferable to house as large a proportion of the crop as possible in modern stores rather than to sustain losses through mice or weather damage.

### The Fencing Job.

In the days when fencing timber was plentiful, posts were usually placed about 10 feet apart, and experience has shown that the most efficient fences are those with panels of about that width. The increasing scarcity of suitable timber, however, together with much higher labour costs, have in recent years compelled landholders to exercise greater economy in the use of posts, and the panels now are of much greater width; in extreme cases posts are as much as a chain apart.

In erecting a fence, however, efficiency must be taken into consideration as well as cost, and it is very bad economy to endeavour to save a little on the original cost by reducing the number of posts if the result means higher costs of maintenance or a fence that will not give the desired protection. Serious loss may occur through weak fences. The loss consequent upon several valuable working horses breaking through a weak fence on to ripe wheat, for instance, may be much greater than the saving effected in the erection of the fence.

While, however, it has been found that the strongest fences are those with panels of from 10 to 12 feet, experience has also shown that fences strong enough to resist all reasonable strains can be erected with panels of much greater width, provided suitable droppers are used. The extra cost involved in erecting a fence with narrow panels where fencing timber is expensive or difficult to obtain is therefore not always justified. In general, if posts are comparatively cheap and plentiful, panels can be made about 12 feet apart, but where posts are not easily obtainable the panels should be made wider, and droppers used instead. A suitable width for a panel is then 22 feet.

The chief points to be considered in selecting timber for fencing—though the choice will of course be limited by the kinds available in the vicinity of the area to be fenced—are strength and resistance to decay and to the attacks of white ants, and also to fire. Size is also an important consideration, though this depends on the kind of timber used, and upon the age of the tree from which the posts are cut; as a rule small trees are sappy and decay quickly. The most desirable size for posts is

about 8 inches by 4 inches; they are then strong and usually durable. Some kinds of trees, however—notably, the buddah of the western country—are extremely durable and strong, and posts of 4 inches to 5 inches diameter are quite satisfactory.

### Profit in Pigs—Excellent Weights.

Discussing the weights attained by the first and second prize litters in the large Yorkshire section at the recent Melbourne Show, Messrs. Fairchild and Clutterbuck, whose stud is at Tinamba, Victoria, stated that they devoted a great deal of care and attention to the preparation of these pigs and spared no effort to place them before the Judge in the very best form possible. The litters and the sows, too, were shown to perfection and were as pretty as paint, and considerably more profitable.

The weights of these show litters of large white pigs (that is, large Yorkshires) at sixty-two days old were—

| | Name of Dam. "Vaucluse Vanity" | Name of Dam. "Vaucluse Venus" |
|---|---|---|
| Pig Marked in Ear No. | 373 boar 78 lb. | 381 boar 68 lb. |
| | 374 boar 75 lb. | 382 boar 72 lb. |
| | 375 boar 71 lb. | 383 boar 59 lb. |
| | 376 boar 68 lb. | 384 sow 59 lb. |
| | 377 sow 64 lb. | 385 sow 69 lb. |
| | 378 sow 71 lb. | 386 sow 66 lb. |
| | 379 sow 73 lb. | 387 sow 73 lb. |
| | 380 sow 61 lb. | 388 sow 65 lb. |
| | — | 389 sow 64 lb. |
| | Total 561 lb. | Total 595 lb. |
| | Average 70.12 lb. | Average 66.11 lb. |

Their feed was comprised of crushed barley, crushed wheat, pollard, linseed meal, bone meal, and skim milk, with the addition of all necessary minerals, and ½oz. of cod liver oil daily per pig. The feed was supplied three times daily in the form of a slop. Of course green feed was at all times available and they were allowed any amount of exercise.

These pigs were all tattooed in the ears at five weeks old and the tattoo marks were as clear and distinct as if they had actually been painted on. It would be interesting to have records of the weights attained by other pigs of this or other breeds, and these, if certified to, will be given publicity in these columns as opportunity offers.

### Weed, Breed, and Feed.

The requirements for herd improvement may be put into three words—*weed, breed,* and *feed.* The first step to weeding, or culling, is herd recording, in order to discover the "boarders" among the cows, and with respect to breed also the joining of a herd-recording unit is helpful, for although a sire that is able to beget heifers that will be high producers of milk and fat is cheap at a great many guineas, his purchase may be impossible to an individual farmer. An association of farmers, on the other hand, as in a herd-recording unit, will find such a purchase possible. As to feed, it would be impossible to lay too much stress upon it in relation to production, and though the commercial factor must not, of course, be lost sight of, by means of recording the dairy farmer in eventually in possession of a herd well worthy of good feeding.

Herd recording is the recording of each cow in a herd systematically over a lengthened period to ascertain its annual yield in milk and butter-fat, at the same time setting down, not only this production, but all factors that influence it—writing each cow's history and putting it in a card index. No business can be carried on without bookkeeping—the more departments there are, the more urgent is the need for a complete system of accountancy, otherwise effort is wasted, profit disappears, and no progress is made. The average dairy-farmer has forty to fifty departments in his business in the herd alone—each animal is a separate entity.

But an accountancy system will not by itself make for success in any enterprise: it is but a guide and help to the management. Building up production in dairy herds in this is like any other business. Recording by itself is not the cure-all of the average farmer's present precarious position—it can only point out the results of his methods and the merits of his stock under his system of management. He may have cows that under good conditions would be high producers, but because of faulty management, such as bad feeding, ill-usage, &c., they are unprofitable. The production record shows this and stresses the lesson never to condemn an animal until it has had a fair chance to prove itself. By watching results one learns the value of

feeding fully and regularly, never to waste the surplus fodder of a good season, nor to allow stock to go half starved in the winter or in dry spells.

Loss through neglect to make provision for feed—not only against those periods of acute scarcity which occur occasionally but also to supplement the natural pastures during those short periods of scarcity which occur at one period or another every year—constitutes a heavy charge on dairying. Growing of fodder crops, conservation of fodder in the form of silage, and improvement of the natural pasture by top-dressing and the sowing of grasses are all important as means of reducing such losses.

### Importation of Pedigreed Stock.

The Minister of Agriculture and Stock, Mr. H. F. Walker, has been advised officially that the Federal Government has agreed to co-operate with the respective State Governments, the Empire Marketing Board, and the shipping companies in the defraying of the freight incurred on the importation of pedigreed stock from the United Kingdom. The class of stock to which this concession will apply comprises approved registered pedigreed stud cattle, sheep, and swine. The details of the scheme are:—

1. The following proposals shall apply in connection with the transport of approved registered pedigree stud cattle, sheep, and swine from the United Kingdom to Australia.

2. All other incidental expenses connected with the transport of the stock from the port of export in Great Britain to the port of importation in Australia, such as provision of stalls, cost of water, fodder, quarantine charges, and attendance during the voyage, to be borne as follows:—

(i.) One-third by the purchaser.
(ii.) One-third by the Commonwealth and State Government concerned in equal proportions.
(iii.) One-third by the Empire Marketing Board.

3. Where assistance is granted to any breeder, he shall not dispose of the stock within two years of the date of its importation, and should it be necessary for him to sell during that period, the amount of any assistance granted to him shall be refunded.

4. The purchaser to insure any animal imported to place of destination and for one year thereafter. Special insurance to be effected to cover quarantine. In case of total loss, purchaser to replace the animal by importation from the United Kingdom or refund all assistance granted from Government sources under the scheme.

5. Scheme to operate for two years from 1st October, 1929.

Those desirous of taking advantage of the scheme should make application to the Under Secretary, Department of Agriculture and Stock, Brisbane, giving full particulars of the class of stock they wish to import, and obtain the approval of the Minister. In the event of approval by the Minister to the transaction the shipping companies will then be advised and the necessary arrangements will be adjusted on the basis of the terms set out.

### How to Cure a Hide.

A clean, well-cured, good-shaped hide, free from scores, cuts, blemishes, and slip will fetch top values, but there is a heavy annual loss due to neglect with regard to the above-mentioned points. The following directions for the curing of cattle hides are given in a recently published departmental pamphlet:—

The hide must be kept clean of blood, dirt, manure, or other debris, and allowed to cool. It should be laid out in a clean place, and liberally and evenly sprinkled with coarse salt. The quantity necessary is about 18 lb. per hide. The legs, neck, and edges of the hide require special attention, as they are the first to show the effects of bad salting. If the hide is to be disposed of at once, it should then be folded by throwing the sides over the centre, then the neck and tail-end again folded over, and rolled up into a bundle and tied with thin rope or stout twine. Wire should never be used, as it will eventually stain the hide. Efficient, clean, and quick salting is necessary to prevent the hide from turning more or less putrid. Putrefaction causes the hair to fall or slip, and "slippy" hides are frequently not worth tanning.

If it is intended to store the hides to make one large consignment they should be cleaned, and when the animal heat has escaped, placed on a clean floor which has been sprinkled with coarse salt. The hide should be laid down, fleshy side up, and sprinkled evenly with clean coarse salt. The next hide may be laid on top of the previous one and salted similarly. After being salted for a fortnight or longer they can be folded ready for sale and firmly tied with thin rope. Before bundling, any superfluous salt should be shaken or swept off.

If it is intended to keep skins on hand for any length of time it will be necessary to spray or paint them with an arsenical preparation in order to prevent the ravages of weevils or other vermin. A satisfactory spray can be made by adding 1 lb. arsenic and 3 lb. soda to 5 gallons of water and then boiling the mixture; when dissolved make up to 15 gallons of water. If preferred, arsenate of soda, procurable at most country stores, may be used in the strength of 1 lb. to 5 gallons of water. Another preparation can be made in the following way:—Dissolve 1 lb. arsenate of soda in 5 gallons of cold water; place 1 lb. bitter aloes in 2 gallons of water and boil until the aloes are properly dissolved, and add 1 pint of the aloes mixture to every 5 gallons of the arsenate of soda mixture. The spray is then ready for use.

Any preparation should, of course, be painted on the fleshy side of the skin.

Calfskins may be treated and folded in the same way as cattle hides. Two or three or more may be folded together to make a fair-sized bundle, and tied firmly together with strong twine or thin rope.

Inefficient curing and the dirty and stained condition in which hides and skins are often marketed do much to depreciate their value. Carelessness in these respects, together with faulty methods of flaying the skins of cattle and sheep and excessive branding of cattle and calves, is responsible for reduced returns to consignors, other causes of depreciation of the quality of the product being cuts and score-marks received by the living animal through horning, contact with barbed-wire, and other external injuries.

**Poddies or Pigs?**

Which pays the better—to devote the skim milk available on the dairy farm to the rearing of calves or to the feeding of pigs? In the opinion of many dairy farmers the pig is much the more profitable proposition.

Discussing this question in an address referred to some time ago in these notes, one South Coast farmer observed that one could not help noticing the enormous quantity of skim milk that was somewhat aimlessly fed to calves each year. If the trouble were taken to follow these calves to their ultimate exit from the district, it would probably be found that they were bought for stocking districts where farmers considered it more profitable to raise pigs, and to buy their calves from the districts where the farmers had never taken the trouble to sit down and think things out a little more thoroughly. No sound reason existed for farmers in that district raising more than 15 per cent. of the herd in female calves each year in order to replace ordinary depreciation of dairy herds. If all male calves and all female calves not required for replenishing herds were destroyed and the skim milk fed to pigs, South Coast farmers would, in the speaker's opinion, be in a much better financial position.

The same view was expressed by Mr. J. Alcock, at the recent State conference of the New South Wales Agricultural Bureau. The time had arrived for the greatest economy in every detail connected with dairy farming, said the speaker, and the loss on calves constituted one of the great leakages. Advancing the case of the pig as against the calf, Mr. Alcock compared the costs involved in rearing in relation to the value of the products.

When the calf was, say, five days old, it had a cash value of about 5s. 6d. (4s. 6d. for the hide and 1s. for the carcase as pig feed). For the first two weeks it was fed 1 gallon of sweet milk daily, the third week it was fed ¼ gallon of sweet milk and ¼ gallon of separated milk daily, the fourth week it was fed ½ gallon sweet milk and ¾ gallon separated milk, for the next ten week 1½ gallons separated milk, and for the following thirteen weeks 2 gallons. This made a total of £2 10s. 2d. for feed alone, or, adding the value of the calf, a grand total of £2 15s. 8d. This calf was worth only 30s. to 35s. on any market; in fact, he had seen them sold for 10s. a head. At the present time choice lines of Jersey heifers were changing hands at under £3, and these would average nine to twelve months old.

Suppose, on the other hand, a farmer were to buy a sow near farrowing for £8. The cost of feeding would be that of a gallon of separated milk plus 3 lb. grain daily for two months, or £1 12s. 8d., making a total (with the £8 for the cost of the sow) of £9 12s. 8d. He would assume that the sow produced nine pigs, which was only an ordinary litter. The sow was then worth, say, £4 10s. without the pigs, leaving the value of the nine pigs at £5 2s. 8d., or 11s. 5d. each. The ration for these pigs for the third month was 28 gallons of separated milk, plus 48 lb. grain, for the fourth month it was 45 gallons separated milk and 60 lb. grain, and for the fifth month it was 45 gallons of separated milk and 70 lb. grain. This made the total cost of the pigs £2 5s. 11d. A pig of this age and fed on the ration described, with pasture in addition, should weigh at least 120 lb. dressed weight, and the average price for this class of pig was £3 10s.

Thus, said the speaker, the pig showed a profit of £1 4s. 1d. and the poddy a loss of at least £1. He had charged nothing for pasture for either, but the balance would still be in favour of the pig.

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.*

### SAVE THE BABIES.

#### A Season of Danger for the Infant.

The hot season is coming. Probably more babies will die during the next three months than during any other three months of the year. It is (though it should not be) the dangerous season for babies. They will die of an infectious and preventable disease. Save the babies!

Last year 112 babies under one year died in Queensland of this disease; the year before 214 died—nearly twice as many. Have our Baby Clinics doubled the efficiency of their work in the past year? Are our Queensland mothers twice as wise? We wish it were so. A part of the decrease may be due to better mothercraft. Most of it was due to good luck. Possibly this year we may have bad luck. The summer before last Rockhampton suffered from a summer epidemic which killed fifty-one babies under two years of age in three months. This season some other town may be threatened by a similar epidemic. Shall we trust our infants' lives to luck, to chance, to fortune? Save the babies!

Summer diarrhœa, dysentery, gastro-enteritis, by whatever name you like to call it, is an infectious disease. It is caused by dysentery bacilli, which are carried about by flies. It is not caused directly by hot weather. Nor has the Jacaranda, which happens to flower at this time of year, anything to do with it. The infection is never present in freshly boiled or scalded milk, for boiling kills dysentery bacilli. If the milk was stale and dirty before boiling, it will give babies simple diarrhœa; it cannot give them dysentery. The milk may be infected after boiling, so may any kind of artificial food, so may the baby's bottles, teats, and dummies. Those who sell dried milks or patent foods may suggest that in them lies perfect safety. It is not true! Foolish beliefs put into mothers' heads are paid for in infants' lives. Save the babies!

#### Natural Food for the Young Australian.

Save your babies by giving them their natural food—the only food which is perfectly clean, fresh, and safe. Never wean a baby during the next three months if you can possibly help it. If you must wean it, or if it has been weaned already, exercise the utmost care. Scald the milk, scald the bottles, scald the teats, then keep them most carefully covered from flies. Every single fly may carry death for your babe, or, failing death, an anxious, painful, and enfeebling disease. The strongest and finest baby may die of it. Nothing can make the dummy safe. It is a perpetual attraction to flies. Burn it. You may think that the dummy keeps your baby from crying and makes him happier. You are mistaken; but even if you are right, it is better that some babies should cry a little than that one healthy baby should die of dysentery. Be warned in time. Save the babies!

#### The Responsibility of Local Authorities.

And you Municipal and Shire Councillors, you are partly responsible. The flies get most of their dysentery bacilli from your closet pans. No doubt you have excellent Regulations to prevent flies from getting access to these pans. Do you enforce those Regulations? Have you sufficient and efficient Inspectors? Do you prosecute? Unless you prosecute a few careless people, your Regulations are useless. Save the Babies!

*Photo.: Dept. of Public Instruction.*]

PLATE 190.—A TRAVELLING DOMESTIC SCIENCE SCHOOL IN QUEENSLAND. A MUSTER OF SCHOLARS AT HERBERTON, NORTH QUEENSLAND.

There are very few schools in the State having an attendance of twenty girls over the age of twelve years for which provision is not made for Domestic Science Instruction. Even in very sparsely settled districts the travelling schools have been able to do very efficient work.

**Keep Cool.**

We do not say that every mother who does her very best will never lose her baby. That would not be fair nor true. There is no perfect safety for anyone in this world. But we do say that such cases will be very rare. There is no need, nor excuse, for foolish panic. Keep cool. Be very careful. Try not to make a single mistake. If you are in any difficulty, consult the Nurse at the Baby Clinic. She is always willing and anxious to help. If you live too far off, ask for a copy of the Queensland Mother's Book. It will be sent on application. Read it carefully. The lives of our Queensland babies are in the hands of our Queensland mothers. Resolve that this summer you will do your very best, God helping you. SAVE THE BABIES!

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## A CURIOUS INCIDENT.

There was, I am informed, a large gathering at the annual meeting of the Creche and Kindergarten. There is no institution in Brisbane that does more excellent and more delightful work than this. The best work is often least known, and it may therefore be assumed that this meeting was at least as well informed, and probably better, in child welfare as the general community. Just as some twenty years ago I heard the president of a medical congress declare that every child had its character formed at five years of age—a statement which then to me appeared startling—so at this meeting one of the speakers emphasised the importance of educating children between two and five years of age. A following speaker thought that education might begin a little earlier, perhaps at eighteen months, and appealed to the holder of the Chair of Philosophy at our University for his opinion. The Professor at once accepted the challenge, and said he thought it should commence at the first day; whereat the audience laughed, indeed their merriment was great and general. The unexpected, the incongruity, philosophers tell us, is closely allied to the ludicrous, and here were two unexpecteds—the absurdity of the opinion expressed, and the source from which it came. The Professor had made a joke!

**No Joke.**

But the Professor had made no joke. He had simply stated, what everyone ought to know. If he had said that the first thing a baby does is to breathe and cry, or that the first thing done to it is to put it in a bath, no one would have laughed. There are some who maintain that wherever there is life there is in some sense mind; an opinion which it is equally impossible to confirm or to refute. If it is not so, when and where does mind begin? Most of our knowledge is conjecture, and the commonest things are the profoundest mysteries. But it is certain that the new-born infant has some sort of a mind, for it can be taught bad habits, and those bad habits are strongly tinged with emotion. The experiment is frequently made, and is often successful. There is no need to repeat it. What is capable of bad must also be capable of good. Certainly the new-born infant should be taught good habits.

**The Baby's Good Habits.**

What are the good habits it may be taught? Firstly that of regularity, to take nourishment at the proper times, to sleep at the right periods, and so of all its bodily functions. Second, to exert itself when necessary, in other words to commence to work for its living, to co-operate at feeding time, not to have food passively poured into it from a bottle, nor to over-exert itself and clumsily swallow air, distending its stomach to its own great discomfort. Thirdly, it has to be taught confidence, trust, faith in its environment, by which we mean its mother. The babe that finds this environment irregular, untrustworthy, or spasmodic is not a happy babe. And so, fifthly, it has to be taught contentment, that state of serenity which only in infants, and sometimes in the very old, ripens into blessedness. Are not these important lessons? Need we argue the matter any further?

Laughter is good for body and mind. It is specially refreshing at public meetings. We hope that those who were present at this meeting will now have a quiet laugh at themselves, for not immediately recognising as a simple truth that which should be known by every woman and every father.

## VEGETABLES.

Vegetables will require constant attention next month, particularly in the Granite Belt area. Tomatoes and potatoes should be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain fall. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

## THE COMPOST HEAP.

The compost heap is a valuable adjunct to the farm, and especially on small areas, where some intensive form of agriculture, such as vegetable growing, is being carried out. A heap or pit can be made very economically. It utilises all sorts of vegetable and animal refuse which would otherwise be wasted, and converts it into a valuable manure, rich in vegetable matter and eminently suited for soils low in humus or subject to droughty conditions.

The principle of the compost heap is the fermentation of easily decomposed vegetable matter in the presence of earth and lime. Not only are substances like peat and straw, which form the usual basis of compost heaps, thus decomposable, but almost every kind of organic substance, both of vegetable and animal origin, can be composted. Dead leaves, bush scrapings, sawdust, weeds, tops and stalks of vegetables, as well as bone and animal refuse can be treated in this manner. In the case of animal refuse the operation is much slower, and substances like bone should be first crushed. It is also important to be sure that animal refuse so treated is not derived from a diseased source.

The best way of making and maintaining the compost heap will depend largely upon local surroundings. As a general method of procedure the following will be found satisfactory. Make a heap with alternate layers of earth, refuse, and lime. Under the term refuse is included all the refuse material of animal or vegetable origin mentioned above. Cover the whole with a layer of earth. When a sufficient quantity of refuse is again collected, place it on top of the heap and cover with a layer of lime, and lastly of earth, until the heap is 3 to 4 feet high. The heap should be kept moist, and for this purpose all refuse water from the house, slops, &c., should be added. The heap may be conveniently watered by making a hole in the interior and pouring the liquid in. The final covering with earth has the object of absorbing any ammonia which is evolved in the process of fermentation and by the action of the lime.

When the heap has been prepared it must be left to itself to ferment for a greater or less time. Probably a few months will be sufficient, unless very refractory substances, such as bone, &c., are present. In a few months' time it should be well forked over and another layer of lime and finally of earth should be added. In the course of another month or two it should be ready for use, and will provide at a very slight cost an excellent manure rich in humus, and will have utilised for the purpose a great amount of refuse material which would otherwise have been lost or burnt.

When refuse material is burnt, the ashes, though still possessing manurial value on account of the lime, potash, and phosphates they contain, are of incomparably less value than the original substances out of which they are derived, owing to the absence of humus material and of nitrogen, which have been lost in the process of burning.

Instead of a heap, the compost may be conveniently prepared in a pit. In either case the bottom should be cemented, or so drained that the liquid escaping from the mass can be collected and returned to the compost.

It will be found advantageous to prepare a second heap while the first one is ripening and being used. It will also be found that if it is desired to use more concentrated fertilisers, such as superphosphate, potash, and ammonium salts, these can be mixed with advantage with the compost manure before it is applied to the land. Used in this way they will be in less danger of leaching away, and will be of greater benefit than if applied directly to the land.

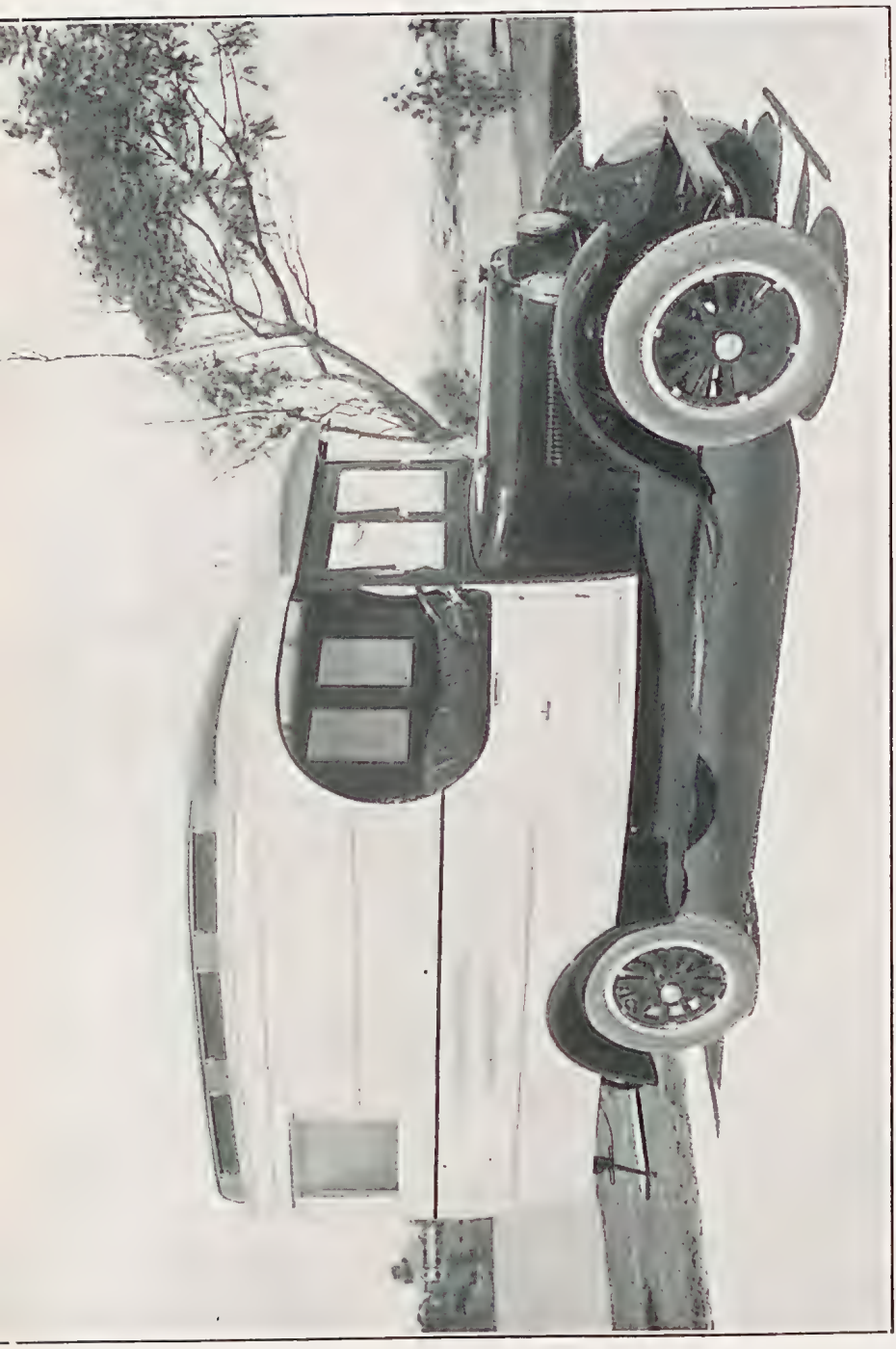

*Photo.: Dept. of Public Instruction.*]

PLATE 191.—A TRAVELLING DENTAL CLINIC IN QUEENSLAND.

The School Dental Service provided by the Department of Public Instruction is of inestimable value, particularly in the country districts. It is ever striving for the better control of dental disease with prevention as the ultimate goal.

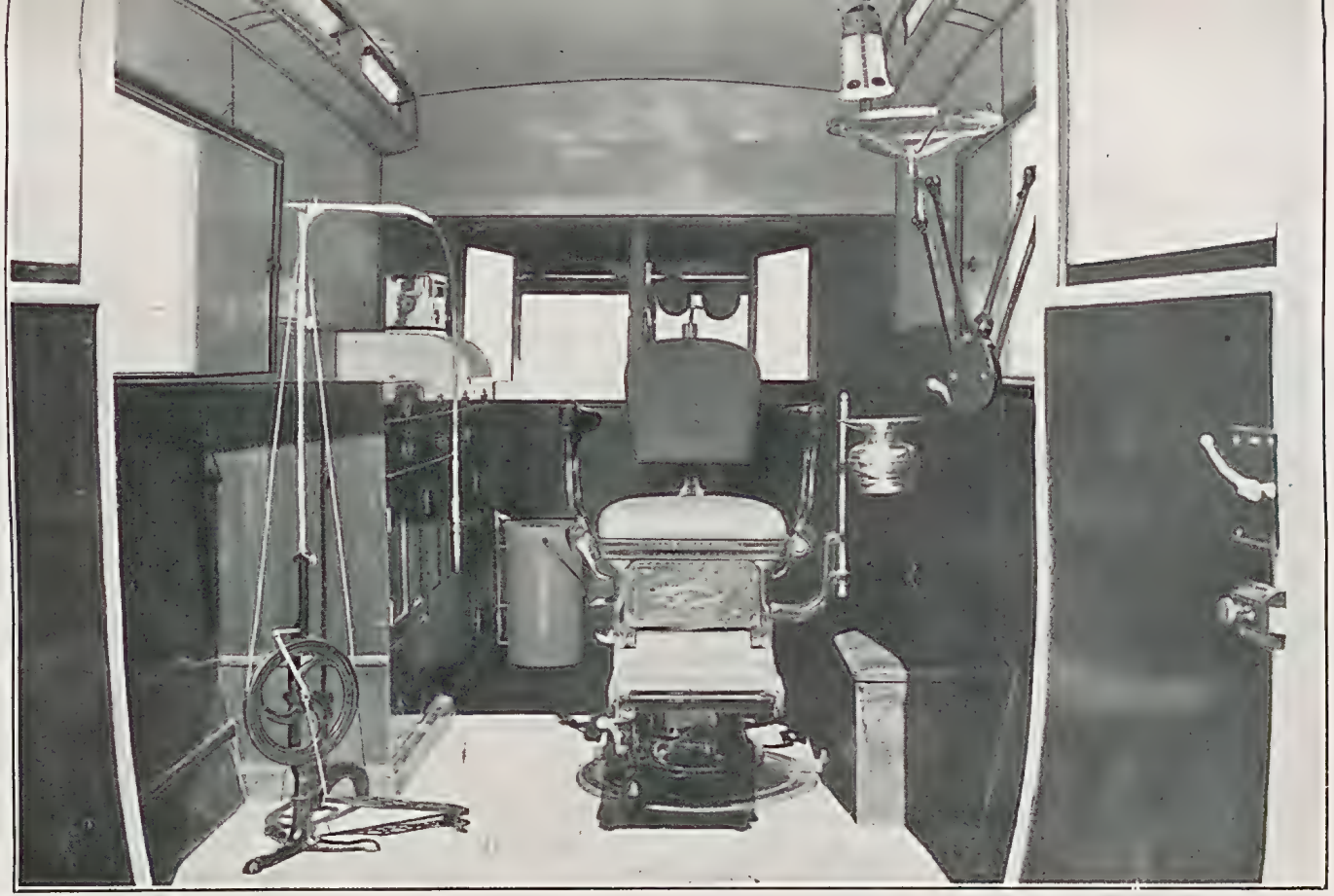

*Photo.: Dept. of Public Instruction.*]

PLATE .192—INTERIOR OF A TRAVELLING DENTAL CLINIC.

In a survey conducted by the Chief Dental Inspector of Schools last year a very great reduction in dental troubles among Queensland school children was recorded, and the number of scholars under conservative dental care had increased by 125 per cent. These results may be credited almost entirely to the corrective operative measures carried out by the Dental Service.

# MARKET GARDENING.

*(Continued from Previous Issues.)*

## CAPSICUM OR PEPPERS.

The capsicum or cayenne pepper requires a light, rich soil and warm situation. Sown in the early spring, the young plants, when large enough, may be transplanted out in rows 3 ft. apart, with a distance of 2 ft. between the plants in the rows. This plant is of easy cultivation and is in considerable demand for pickle and pepper manufacturing.

The larger varieties are milder than those of the smaller kinds. Those recommended are—Long Red; Bird's Eye (for pickling); Large Red (culinary); Dwarf Early Red.

## CARROTS.

The best crops of carrots are grown on land heavily manured for the preceding crop. Deep cultivation is essential. If manuring should be necessary, well-decomposed stable manure may be used, but must be thoroughly incorporated with the soil, and a fine tilth obtained before sowing the seed.

Insufficient depth of cultivation has a tendency to produce forked roots. In shallow soils seed of the short varieties, such as Nantes and Guerande will give the best results.

The seed should be sown thinly, in drills, and care be taken to get the hoe at work as soon as the seed appears. When large enough they should be thinned out from 4 to 6 in. apart, according to size of variety.

The best varieties of long carrots are James's Intermediate and St. Valery, and for cattle-feed the white and yellow Belgian varieties.

Carrots are fit for use in about four months.

## CELERY.

This crop requires a deep rich soil and a moist situation if possible.

Sow thinly in a good sheltered seed-bed during early autumn. When the plants are 3 or 4 in. high transplant into deeply trenched and well-manured soil.

Celery is generally grown in trenches, although it may be grown in the open ground. This latter plan has the advantage of saving considerable labour, and the plants have a greater depth of soil than if planted in deep trenches, where, in most instances, they would only have the subsoil to subsist on.

During the growing period the plants must be kept free from weeds, and when large enough, may be gradually earthed up, care being taken in the final earthing that the soil does not fall into the heart of the plant.

Varieties recommended—White Plume, Golden Self Blanching, Giant Pascal.

## CHOKOS.

Where a sufficient amount of moisture is available chokos form an acceptable change in vegetable diet. Of climbing habit and easy of cultivation, they adapt themselves to most soils, but best results are obtained from those containing plenty of vegetable matter.

They are propagated from the fruit, which, if planted in the spring, produces a profusion of vines, and a large crop of this useful vegetable for autumn and winter.

## CUCUMBERS.

Suited for rich sandy soils; and if the natural soil does not answer this description it is worth while bringing it up to the required standard in order to ensure success. Seed may be sown in early spring in shallow drills or in hills, with a distance of 4 to 5 ft. between the rows. The soil must be kept loose and free from weeds by frequent hoeings, and applications of liquid manure or abundant watering will be necessary during dry weather in order to procure long crisp fruit. Mulch well.

The variety recommended for market sale is Imperial White Spine, and for pickling Early Green Cluster.

## SHALLOTS AND GARLIC.

The preparation of the soil is similar to that for the onion. The cloves should be placed in shallow drills spaced 6 in. apart, care being taken not to cover them too deeply. As they grow they should not be earthed up; on the contrary, when approaching maturity the soil may be lightly drawn away from them with a hoe. This exposes the bulb and facilities ripening. Shallots are used for culinary and salad purposes, their flavour being milder than that of garlic or onions. They may be planted in early spring or autumn.

## GINGER.

Is suited only to warm situations, and is easily grown in any light loam rich in vegetable matter, and possessing good natural drainage.

Cultivation is similar to that necessary for potatoes, the only difference being that prior to planting the land is ridged with a drill plough, the ridges being 3 ft. apart, the rhizomes planted during September in the ridges 12 in. apart and about 3 in. under the surface.

The crop matures in about ten months, and should be harvested after the tops have died off.

In lifting, care should be taken not to injure the hands or rhizomes.

The preparation of these for market is the placing of them in boiling water for about five minutes and then drying in the sun.

## HERBS.

These are worthy of more attention than is usually given to them, owing to the increased demand which at present exists.

Formerly the Australian market was supplied by European countries, large importations of dried herbs being made from England and France.

Herbgrowers in the Cleveland district are waking up to the fact that a profitable industry is at their doors, and this has resulted already in larger areas being put under marjoram and sage, for which local buyers have in many instances entered into contracts to purchase twelve months ahead.

Any soil of a loamy character and containing plenty of humus is suitable for the growth of herbs, but cultivation must be attended to and all forms of weed-growths kept down. Sage, thyme, and marjoram are usually propagated from cuttings or division of the roots, but they may also be raised from seed sown in early spring. Two or three cuttings may be obtained in a year, the crop being cut when coming into flower, a sharp sickle being used, and the plants cut close to the ground.

After cutting, they should be allowed to wilt in the sun, and then thoroughly dried under cover, to retain as much colour as possible.

## KOHL-RABI.

Kohl-rabi, or turnip-rooted cabbage, is, as its name denotes, an intermediate between the cabbage and turnip combining the flavour of both. The edible portion consists of a turnip-shaped bulb, which is in reality a swelling of the main stem. For table, this should be used when quite small, as it is then tender and delicate, but if allowed to reach maturity it becomes tough and stringy. The purple variety is the best for table use; whilst for cattle-feeding the green variety is most suitable. This plant is remarkable for its immunity from insect attack and power to resist frost and fungoid diseases. It will stand transplanting better than any other root crop, thus rendering it valuable for filling up blanks.

The sowing and subsequent cultivation is similar to that for swedes.

## LEEKS

Leeks appreciate a deep, friable, and rich soil. Sow in spring and early summer, and when the thickness of a goose-quill transplant into shallow trenches, spacing the plants 6 in. apart and nipping back the tops in the process of transplanting. Treat as you would celery, gradually drawing the soil up the stem as the plant grows, thus blanching them. Keep well watered during the dry months; liquid manure can be applied with advantage.

The seed may be sown in the autumn, and varieties recommended are—London Flag, The Lyon.

## LETTUCE.

This useful salad plant may be had all the year round by frequent sowings and plantings.

A warm dry situation should be chosen for the winter crop, and one that is shaded and moist for summer sowings.

The soil should be loose and rich, for lettuces are only crisp when rapidly grown.

Summer sowings must be made where the plants are to stand, as they cannot be transplanted during the dry, hot weather with any degress of success.

Varieties recommended are—Neapolitan; Hanson; Iceberg; May King.

### MUSTARD AND CRESS.

With a climate in which salads and green foods are necessary, these useful salading plants are usually conspicuous by their absence. The seed may be sown thickly in broad rows and cut when about 2 in. high. Cress being a slower grower than mustard, if intended to be used with it, should be sown a week earlier. For succession sow every ten days.

### ONIONS.

The onion requires a deep, loamy soil, and one which lends itself to deep cultivation.

The character of the soil determines the depth of ploughing, which cannot be too deep, provided the subsoil is not brought to the surface.

Frequent cross-cultivation and harrowings are essential to reduce the soil to a fine tilth and destroy any weed-growth which might otherwise put in its appearance during the process of cultivation.

The soil having had a thorough course of preparation should be rolled for the reception of the seed, which is sown in shallow drills spaced 12 to 15 in. apart.

For large areas, sowing the seed by a special onion-drill is recommended. Several inexpensive makes are advertised by various implement makers.

From its first appearance above the soil the crop must be kept absolutely clear of all weeds and foreign growth if success is to be attained.

Where blanks are present, transplanting may be carried out, but care must be taken that the plants are not put in deeply, as this is conducive to thickness in the stem, with attendant poor keeping qualities.

On reaching maturity bending the stems over is of great assistance in ripening; when the tops are thus withered, the bulbs should be lifted; and where a considerable quantity of bulbs has to be dealt with, hand and horse-drawn implements are available at a moderate cost, considerably reducing what otherwise is a somewhat tedious operation.

The bulbs should be left in windows until dry, when they can be carted and stored in racks—not too deeply—in a well-aired shed; care being taken that they are not bruised in the operation. It is advisable to turn them from time to time and remove all damaged or decayed bulbs.

The seed for the main crop should be sown in the autumn. The varieties recommended are:—Hunter River Brown Spanish and Australian-grown Brown Spanish, for keeping; Silverskin or Queen, for pickling; White Lisbon, for pulling green for salads; White Italian Tripoli, for early cropping.

NOTE.—For pickling and salad purposes the seed requires to be sown thicker.

(*To be continued.*)

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## DRACAENAS.

Dracænas are hardy plants with very richly coloured and variegated foliage. They are closely allied to the genus cordyline, with which they are often confused. The difference between the two is chiefly in the character of the fruits, there being generally one ovule in the dracæna and many ovules in the cordylines. Dracænas are among our most beautiful foliage plants. Propagation is generally by cuttings, which root readily at any time of the year. The old stem of the plant, cut into short lengths and planted in a compost, invariably roots, and throws up shoots which may be potted up. The root suckers which are often found upon old plants are also useful for increasing stock. All that is necessary is to cut them off and pot them.

The best soil for potting the young stock is made of equal parts of loam and leaf mould, with sufficient sand to keep the soil porous. Dracænas do not require large pots, but they must be firmly potted and given plenty of water.

Mealy bugs and thrips are the chief enemies. The large leaves permit of the free use of the sponge. Dracænas are fine indoor plants, but they must not be kept inside for more than a week or so at a time, and they must be kept out of draughts.

# Farm Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasseling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resisting. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well-balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary; otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

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# Orchard Notes for December.

## THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weeds of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or

inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look our for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

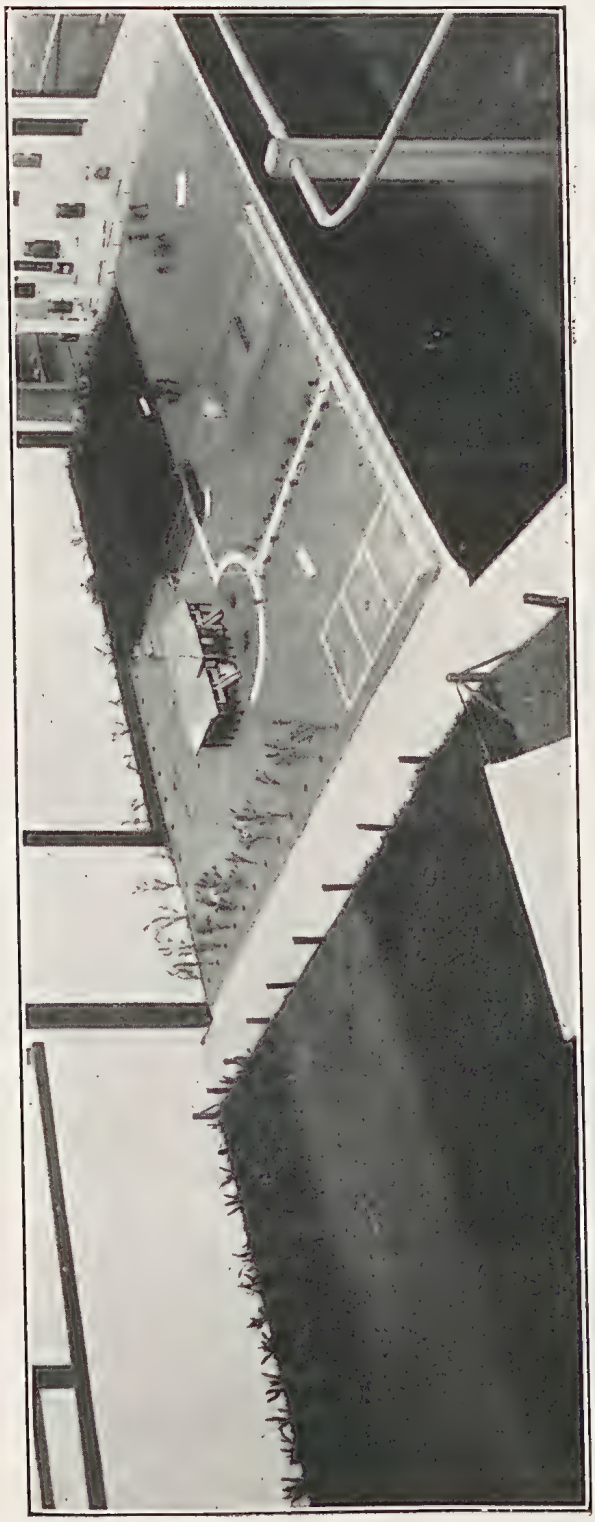

PLATE 193.—MODEL OF A QUEENSLAND COUNTRY SCHOOL IN THE RURAL SCHOOL'S DISPLAY. ROYAL NATIONAL ASSOCIATION SHOW, 1929.

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J. F. F. REID,
Editor of Publications, Department of Agriculture and Stock.

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# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | November, 1929. | | December, 1929. | | MOONRISE Nov., 1929. | MOONRISE Dec., 1929. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | a.m. | a.m. |
| 1 | 5.4 | 6.8 | 4.50 | 6.32 | 4 42 | 4.24 |
| 2 | 5.3 | 6.9 | 4.50 | 6.32 | 5.6 | 5.9 |
| 3 | 5 3 | 6 9 | 4.50 | 6.33 | 5. 50 | 5.57 |
| 4 | 5.2 | 6.10 | 4.50 | 6.34 | 6.30 | 6.48 |
| 5 | 5.1 | 6.11 | 4.50 | 6.35 | 7.15 | 7.42 |
| 6 | 5.0 | 6 12 | 4.50 | 6.35 | 8.4 | 8.37 |
| 7 | 5.0 | 6.12 | 4.50 | 6.36 | 8.57 | 9.31 |
| 8 | 4.59 | 6.13 | 4.51 | 6.37 | 9.49 | 10.26 |
| 9 | 4.58 | 6.14 | 4.51 | 6.37 | 10.38 | 11.20 p.m. |
| 10 | 4.58 | 6.15 | 4.52 | 6.38 | 11.40 p.m. | 12.16 |
| 11 | 4 57 | 6.16 | 4.52 | 6.38 | 12.36 | 1.11 |
| 12 | 4.57 | 6.16 | 4.53 | 6.39 | 1.33 | 2.9 |
| 13 | 4.56 | 6.17 | 4.53 | 6.39 | 2.29 | 3.10 |
| 14 | 4.55 | 6.18 | 4.54 | 6.40 | 3 28 | 4 17 |
| 15 | 4 55 | 6.19 | 4.54 | 6.40 | 4 30 | 5.27 |
| 16 | 4.54 | 6.20 | 4.55 | 6.41 | 5.33 | 6.36 |
| 17 | 4 54 | 6 21 | 4.55 | 6.41 | 6.43 | 7.46 |
| 18 | 4 54 | 6 22 | 4.55 | 6.42 | 7.52 | 8.50 |
| 19 | 4 53 | 6.23 | 4.56 | 6.43 | 9.0 | 9.47 |
| 20 | 4.53 | 6.23 | 4.56 | 6.44 | 10.4 | 10.30 |
| 21 | 4.53 | 6.24 | 4.56 | 6.44 | 11.3 | 11.9 |
| 22 | 4.53 | 6.24 | 4.57 | 6.45 | 11.53 | 11.43 |
| 23 | 4.52 | 6.25 | 4.57 | 6.45 | .... a.m. | ... a.m. |
| 24 | 4.52 | 6.26 | 4.58 | 6.46 | 12.46 | 12.16 |
| 25 | 4.52 | 6.27 | 4.58 | 6.46 | 1.15 | 12.46 |
| 26 | 4.51 | 6.27 | 4.59 | 6.46 | 1.42 | 1.18 |
| 27 | 4.51 | 6.28 | 4.59 | 6.47 | 2.13 | 1.51 |
| 28 | 4.51 | 6.29 | 5.0 | 6.47 | 2.44 | 2.27 |
| 29 | 4.51 | 6.30 | 5.0 | 6.47 | 3.14 | 3.6 |
| 30 | 4.51 | 6.31 | 5.1 | 6.48 | 3.39 | 3.52 |
| 31 | | | 5.2 | 6.48 | | 4.43 |

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

## Phases of the Moon, Occultations, &c.

| | | | |
|---|---|---|---|
| 1 Nov. | ● New Moon | 12 | 1 p.m. |
| 10 „ | ☾ First Quarter | 12 | 10 a.m. |
| 17 „ | ○ Full Moon | 10 | 14 p.m. |
| 24 „ | ☽ Last Quarter | 2 | 4 a.m. |

Apogee, 7th November, at 9·0 p.m.
Perigee, 19th November, at 3.48 p.m.

If it were not for their apparent nearness to the Sun, the remarkable proximity of Mercury and Mars to one another on the 30th would form an interesting spectacle. They will rise practically with the Sun, but, of course, will be entirely lost in its effulgence. Venus and the Moon will be looking on from the near neighbourhood, but it will be a day later before the Moon joins the brilliant-gathering by drawing, apparently, much nearer to the Sun.

By the time the Sun sets on the 1st November the Southern Cross reaches a position so low down in the south-west that it may be said to be lost to the evening sky for the next four months, as far as Queensland is concerned.

| | | | |
|---|---|---|---|
| 1 Dec. | ● New Moon | 2 | 48 p.m. |
| 9 „ | ☾ First Quarter | 7 | 42 p.m. |
| 16 „ | ○ Full Moon | 9 | 38 p.m. |
| 23 „ | ☽ Last Quarter | 12 | 27 p.m. |
| 31 „ | ● New Moon | 9 | 42 a.m. |

Apogee, 5th December, at 3.24 p.m.
Perigee, 17th December, at 10.6 p.m.

Conjunctions of the Moon with Mercury and Mars will occur on the 1st, when all are below the horizon in Queensland.

Mars, which was disappearing from the evening sky soon after sunset in October, will be passing from the east to the west side of the Sun on 3rd December. It will then be on the far side of its orbit and about 140 million miles beyond the Sun. Mars will be rising and setting so nearly at the same time as the Sun that it will be practically invisible this month, but the much larger planet Jupiter, being on the opposite side of the sky, will rise on the 3rd as the Sun sets. Venus will be noticeable only in the early morning a little before sunrise, and will be loosing her brilliance as the month advances.

Mercury, apparently amongst the stars of Orphineus, and higher up Saturn, apparently in Sagittarius, will be noticeable near the western horizon as the twilight decreases on the 15th.

Mercury and Mars, which appeared to be in nearly the same place in the sky on 30th November, will set only about a quarter of an hour after the Sun on 1st December, but the rapid motion of Mercury will carry it eastward so quickly that it will not set until an hour and three quarters after the Sun on the 15th, while Mars will set a quarter of an hour before the Sun. Jupiter will rise at 6.41 p.m. on 1st December, and at 5.36 p.m. on the 15th; Saturn will set at 8.6 p.m. on the 1st, and at 7.17 p.m. on the 15th.

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# QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXXII. 1 DECEMBER, 1929. PART 6.

## Event and Comment.

### The Year in Agriculture.

A GENERAL survey of the agricultural position in Queensland is made by the Under Secretary for Agriculture and Stock, Mr. E. Graham, in his annual report which was recently presented to Parliament. In it he states that the general average yield of wheat crops was not as heavy as in the previous year, which was remarkable for an extraordinarily good season; but, on the whole, for the period under review the returns were satisfactory. A steady improvement in methods of cultivation was noticeable, especially on the Downs, where the practice of summer fallowing is becoming more general. Wheat-growing is now allied to dairying and sheep-raising to a much larger extent than formerly, and the value of this economic combination is becoming evident to many more farmers in the districts where the conditions are suitable for all three branches of husbandry. The wheat-breeding and extension work of the Department is proceeding satisfactorily. Experimental and general observation plots have been established in different districts. The systematic breeding and selection of wheats adaptable to our conditions of summer rainfall, which are carried on at the Roma State Farm and have continued over a long period, have been of material benefit to the grain-grower. About a hundred new Roma crossbred wheats are tested each season, and in these field trials the Department has had the co-operation of the farmers and also of the Wheat Board. As a stimulus to the application of scientific principles to primary production, the usual annual wheat crop competitions were held in the course of the

year in the Warwick and Toowoomba districts. That the educational value of these competitions is widely recognised is evident by the keen interest taken in them by grain-growers.

Maize-growers are feeling the effects of a lessening demand, due to the ever-increasing use of motors on the road and tractors in the field. A depression in the industry was relieved to some extent by the necesity of hand-feeding sheep, for which maize is being more extensively used as a supplementary stock food in districts affected by prolonged dry spells.

Northern growers are handicapped by their geographical position, which involves heavy charges in the transport of grain to available markets. Farmers there are, however, appreciating the economy of retaining, when practicable, their grain on the farm for feeding and fattening stock.

In the seed maize improvement work satisfactory progress is being made, and the demand for seed of improved varieties selected by the Department is constant.

The maize exhibits at the Royal National and at many country shows, in the course of the year, illustrated the marked improvement in the types and quality of Queensland-grown grain, and it is satisfactory to observe that in the more important maize-growing districts the principal varieties are of departmental origin. The educational scheme initiated and carried on by the Department, and which covers the systematic breeding and regular distribution of pure seed, is the main contributing factor in bringing about this result. Three-fourths of the maize production of the State is raised in the Southern Division, which had the benefit of a fairly good season, and the Queensland yield for the year is estimated to exceed 4,000,000 bushels. Of other field crops a similar story of steady progress and satisfatory yield is related.

Improvement of paspalum and other pastures engaged the attention of the field staff in the course of the year. Results so far show that ploughing is the most effective means of resuscitating paspalum grass-lands. Top-dressing of pastures is a subject of continuous research, but from an analytical standpoint results so far have been largely negative. As a counter to the effect of these findings and as a measure of economy, the more extensive use of suitable stock licks is generally advocated.

Grass experiment plots have been established in suitable localities, and in these a number of imported grasses are being tested with varying results.

## The Sugar Industry.

THE sugar industry of Queensland established fresh records during the 1928 season, when 520,620 tons of raw sugar were produced. Conditions favourable for cane growth were general throughout the growing season. The autumn and winter were unusually dry, however, and portions of the crop were affected adversely before the close of the crushing season. This caused a reduction in the early cane estimate, but probably favoured the sweetening of the crop, for it required only 7¼ tons of cane to produce 1 ton of sugar—the lowest ratio yet recorded in Queensland. The heavy production resulted in a very considerable surplus over and above Australian requirements. The question of curtailment of plantings has been an important one during the past year, and it is expected that definite steps will be taken in the near future to restrict the area devoted to cane and hence reduce the surplus.

The exploitation of by-products of the industry continues to receive attention, and alcohol produced by the Sarina Distillery from molasses has been made available this year as a motor fuel. Mixed with petrol in suitable proportion, it is now marketed in Queensland under the name of "Shellkol."

With continued low export values, the Bureau of Sugar Experiment Stations finds growers taking a keener interest in its activities. Advice on the use of correct fertilisers to bring about a more intensive system of cultivation and the consequent reduction in production costs is widely sought. A more active programme of co-operative experimental work has been planned. A system of farm fertility trials has been initiated, and growers are showing a great interest in the project. By this method of field trial work much valuable information should be gained, which will assist the farmers directly concerned and also allow recommendations to be made with a greater degree of confidence. The plan will be extended to varietal trials and cultural experiments. The raising of seedling canes at South Johnstone has

been continued, and all these and similar activities in the scientific field give emphasis to the high standards that have been established in the industry, and these would have been, of course, very difficult of attainment without the intelligent co-operation of the growers.

## Cotton.

IT was possible this season to dispose of the lower grades of cotton in Australia at prospective satisfactory prices. This advantage, together with the arrangement of the Cotton Board for higher first advance on seed cotton at the ginnery, helped the industry very materially. Interest in cotton-growing had definitely increased in the Southern areas prior to the time of planting, but absence of spring rains diverted attention to the necessity of concentrating on the production of fodder crops; and as a result cotton acreages were limited. Good returns have, however, revived interest in cotton-growing, and its extension in the coming year is a reasonable anticipation.

In the South Burnett interest in cotton has been stimulated by the good crops picked on departmental experiment plots in the district, several yielding around 1,500 lb. an acre of high-quality fibre.

Only moderate returns have been obtained in the Central Burnett, where, however, yields up to 1,500 lb. an acre on experimental plots are influencing a substantial extension of cotton cultivation. The experience of the year is on the side of early planting, and this has impressed growers with the necessity of early and thorough preparation of the seed-bed, a practice ensuring a successful strike after the first planting rains. The year's results have, however, not disheartened growers, and an increased planting is planned for 1930.

There was a decline in the standard of cultivation, but this may be ascribed to the various factors, weather included, that affected the year's operations. Notwithstanding seasonal variability, however, the value of timely and systematic cultivation was demonstrated clearly by those growers who realise that it pays to grow cotton in accordance with the principles and practice advocated by the officers of the Cotton Branch.

There was a substantial reduction in the aggregate yield of cotton on last year's returns, and this was due to lower production in the Dawson Valley and smaller acreages in the Upper Burnett. There was, however, a considerable improvement in the general quality of the crop as compared with that of last year. The work of the research station was continued, and results clearly demonstrated the value of early planting.

Seasonal vagaries were against the securing of the best results from our pure seed development work, though considerable success attended seed acclimatisation efforts. The work of developing acclimatised strains of introduced varieties also proceeded satisfactorily, although no remarkable results were obtained.

Varietal tests, fertiliser trials, and cultural methods are receiving the close attention of the Department, to the general advantage of the industry.

## Adding to the Attractions of Country Life.

CONCLUDING his comprehensive review of the year's activities of the Department, which is ever widening its range and extending its influence, Mr. Graham added that, though temporary checks were experienced in some directions, there are good grounds for satisfaction with the progress made. We have to remember that agriculture is not the only industry passing through the stress and strain of a transitional period; it is not the only industry that has had to adapt its methods to modern ideas, modern market requirements, and, in the disposal of some commodities at least, keener competition. The economic side of the business is being tackled resolutely in this State. Through our system of organised marketing of commodity by commodity we are moving gradually, but surely, to the position when we can offer the consumer a better and standardised article more regularly under proper control, and thus earn for the producer a larger proportion of what the consumer has to pay. It will take time, of course, to perfect such a system, but its complete success would mean a more attractive country life, a bigger rural population, decentralisation of economic and commercial interests, and a more rational national development.

# Bureau of Sugar Experiment Stations.

## CANE PEST COMBAT AND CONTROL.

*The Entomologist at Meringa, near Cairns, Mr. Edmund Jarvis, has submitted to the Director of the Bureau of Sugar Experiment Station, Mr. H. T. Easterby, the following report, embracing the period of October to November,* 1929:—

### ASSOCIATION BETWEEN THE ENTOMOLOGIST AND CANEGROWER.

In the present report I have attempted to define the true meaning of the term "Economic Entomologist," and to outline the nature of certain activities which should tend to promote the establishment of cordial relationship between the scientist and cane farmer.

The importance of this close association between entomology and agriculture in Queensland was first recognised as early as the year 1886, which was about the time when Mr. Henry Tryon published his valuable report on the insects and fungus pests of the Toowoomba district; while more than forty years have passed since the Victorian Department of Agriculture began to realise the advisability of appointing a Government Entomologist to fight such destructive insects as the codlin moth, woolly aphis, and apple-root borer, which had then gained a footing in several orchards around Melbourne.

In the year 1889, when the present writer first arrived in Australia, the study of control methods against leaf-eating beetles, caterpillars, and other mandibulate or chewing insects was chiefly confined to various kinds of arsenical sprays; the sap-sucking insects, like aphides, scale insects, plant bugs, &c., being combated in those early days by the use of such well-known contact solutions as resin compound, kerosene emulsion, &c.

At the present time, however, our knowledge of economic entomology has naturally increased, so that, although still continuing to devise more deadly and cheaper poison-baits and sprays, we have now pressed into the warfare numerous species of the parasitic and predaceous enemies of many different insect pests of primary economic consequence; with the result that some of these are now being held in control biologically.

In North Queensland, for instance, the much dreaded "weevil borer" (*Rhabdocnemis obscurus* Boisd.) is at present being kept well in check by a small Tachinid fly-parasite, hundreds of which are regularly propagated at Meringa Experiment Station for free distribution in any canefield chancing to be invaded by the beetle-borer.

It is gratifying to note that this phase of activity—which calls for concerted action on the part of both grower and entomologist—has been instrumental, in our own case, in establishing those harmonious relations which are so necessary to the welfare of all parties concerned.

In this connection it should be mentioned that apart from biological control work, several additional fields of entomological research have been opened up of late years; the most fascinating of these being, perhaps, that dealing with the study of so-called tropic reactions, of a positive or negative kind, which are believed to be manifested by insects in response to influences exerted by various stimuli, affecting the olfactory, auditory, or other complex sense organs.

As already pointed out by the present writer (Proc. Pan. Pac Sc. Congress, vol. 1, pp. 367-68, 1923), we have good reason for assuming that the movements of our principal cane beetle (*Lepidoderma albohirtum* Waterh.) are sensibly influenced by forces of a chemotropic nature; which probably determine to some extent the direction of flight of the female cockchafer during the fortnight preceding egg laying.

It is pleasing to note that the help afforded by this Sugar Experiment Station, to farmers of the Cairns district, appears to have won recognition, and during recent years there have been many applications for assistance in fighting "army worms" and other caterpillars which sometimes strip the leaves of cane plants. Our mode of procedure in such cases is not merely to give advice by letter, but to go into the affected field when possible, taking the necessary spraying apparatus, and to show the grower how to prepare and apply the remedy.

# ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

## When to Expect Appearance of "Greyback" Beetles.

Cane beetles are likely to emerge from the ground about the middle of this month (November). Owing to the prolonged spell of dry weather experienced in many cane districts, transformation from the pupa or chrysalis condition to the adult winged form of this insect occurred in most places early in October. Should a few inches of rain, however, chance to fall during the second or third week in November, such downpour would be followed at once by an emergence of these cockchafer beetles. On the other hand, a continuance of drought conditions throughout November and half way through December should operate as a decided check to the increase of our notorious cane pest.

## Arrange about Collecting Cockchafers.

On cane areas known to be subject to grub attack it is advisable to start collecting the beetles from the foliage of their feeding-trees as soon as they are noticed on the wing.

Now is the time to locate the position of favourite food-plants such as Weeping Figs, "Moreton Bay Ash" trees, &c., chancing to grow close to headlands of your canefield.

To facilitate the work of collecting, the surface of the ground under these trees should be cleared of vegetation, in order that all beetles falling upon it may be easily seen and picked up. Such collecting should be carried on throughout a period of about three weeks, dating from the day on which "greybacks" emerge from the ground. A careful note should be made of this date of commencement of the flighting season, as in the event of any farmer wishing later on to fumigate his soil for cane grubs, such information would enable him to determine the age of the grubs present together with the correct time for starting control measures.

## Keep the Ground Moving during the Flighting Season.

Common-sense control methods of keeping the soil moving between cane rows as much as possible during those periods occupied by the egg and early larval conditions of our "greyback" cockchafer are within reach of all growers, and have already been advocated as being advantageous (Bull. No. 19, pp. 59, 60). A dense growth of weeds between cane rows attracts egg-laden females of both *albohirtum* and *frenchi* ("greyback," and "frenchi beetle"), the latter cockchafer being very prone to oviposit in such places.

Do not allow the surface to remain caked after heavy rain longer than can be helped. Every time the ground is stirred to a depth of about 3 inches soil-moisture is conserved, and a certain percentage of unhatched beetle eggs or small grubs of the first-stage of growth is destroyed, together with germinating seeds and tiny plants of different weeds.

## How to Store Insecticides and Spraying Apparatus.

*Carbon bisulphide.*—Drums containing this fumigant should be locked up in some cool, dry shed. Before storing same, examine each drum for possible leakage. When a drum is opened do not bring a light of any kind near it or even a lighted pipe or cigarette.

*Paradichlorobenzene.*—Keep receptacles containing this chemical, such as barrels or tin canisters, as airtight as possible to prevent needless evaporation of the crystals. This fumigant is not inflammable, and being non-poisonous can be freely handled without the slightest danger.

*Lead Arsenate.*—If purchased in stoneware receptacles it is a good plan to cover the cork and edges of any jars intended for storage with melted paraffin wax, as this will prevent the arsenate paste from drying too quickly.

*Paris green.*—Being a violent poison this should be kept under lock and key and out of reach of children.

*Care of Hand Injectors.*—Keep clean from dirt or corrosive matter; examine working parts at intervals and replace defective washers, &c.

*Spray Pump.*—Thoroughly rinse out the container with clean water before putting the pump away, and run plenty of water through the hose and nozzle. Keep clean and carefully oiled. Repair any leakage to hosing or defective washers.

PLATE 194.—MR. HARRY T. EASTERBY, DIRECTOR OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

(From a photograph taken a few years ago).

Born in 1867 at Echuca, Victoria, Mr. Easterby studied at the Horsham (Victoria) Public School, and applied himself to chemistry and microscopical science, including sugar chemistry, and entered the Sugar Factory at Maffra in 1897, where he studied the technology of sugar under Dr. Riesen, afterwards moving on to take up the position of Chemist with Messrs. Gibson and Howes, owners of the Bingera Sugar Plantation at Bundaberg.

Mr. Easterby was engaged by the Victorian Government to make investigations into the beet sugar industry in 1900 and part of 1901, after which he was appointed Assistant Director to Dr. Walter Maxwell.

Mr. Easterby subsequently became Director of Sugar Experiment Stations, which position he still holds.

The Sugar Experiment Stations during Mr. Easterby's long term of office have developed amazingly. At the time he joined the service there was only one Experiment Station in Queensland. Now there are three Experiment Stations, three Entomological Laboratories, a Sugar-cane Pathological Laboratory, a Sugar Soils Laboratory, and a Sugar Mill Technologists' Laboratory, while the staff has increased from six to twenty-one, including Chemists, Entomologists, Pathologists, and Agriculturists, while the yield of sugar has increased from 120,858 tons in 1901 to 520,620 tons in 1928.

## SUGAR CROP PROSPECTS.

*The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has returned to Brisbane from a visit to some of the sugar areas comprising Cairns, the Johnstone and Herbert Rivers, Mackay, and Bundaberg.*

Conditions in Northern areas were exceptionally dry following a prolonged and cold winter. Rain is badly needed in every sugar district. In spite, however, of the dry weather and grub damage the Cairns crop will be the largest ever harvested, the aggregate tonnage for the three mills—Hambledon, Mulgrave, and Babinda—being expected to reach 630,000 tons of cane, which will produce 90,000

tons of sugar. The young cane is standing up well to the dry conditions, and provided rain falls shortly the prospects for next year are excellent.

The crops at the Johnstone and Tully are also good this year, though Mourilyan is somewhat behind its usual tonnage. Here also the young cane looks well.

The commercial cane sugar in the cane is the highest ever experienced in the districts from Mossman to Lower Burdekin, due to the long spell of dry cold weather following the wet season. It is confidently anticipated that the tons of cane required to make a ton of sugar will be well under 7 in the North, and should be somewhere about this figure for the whole of Queensland. Last year it was 7.18, which was the lowest on record.

In the Herbert River district the farmers earlier in the year suffered from heavy and continuous rain which promoted a heavy growth of weeds, which they were unable to cope with in time.

The dry conditions appear to be much worse at Mackay than in other districts, and, with a good deal of frost, have caused a considerable reduction in the crop. It is now anticipated that the sugar yield for the seven mills will not be more than 75,000 tons.

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## CANE PESTS AND DISEASES.

*The following report upon the Mossman sugar district has been submitted by Mr. J. H. Buzacott to the Entomologist at Meringa, Mr. Jarvis, and is now made available by the Bureau of Sugar Experiment Stations:—*

From the economic entomological point of view, the Mossman district visited this month proved most interesting. The duration of this trip was mainly occupied in making a comprehensive survey of the area, and locating those parts most affected by grubs and other serious pests.

It is interesting to note that the weevil borer, which eight or ten years ago occurred commonly, has now practically vanished, presumably due to the efficient control exerted by the Tachinid fly parasite which was liberated in Mossman by Muir about the year 1910.

The distribution of the cane grub is diverse, but undoubtedly the most severe infestation occurs at Cassowary, where, on some farms, the damage has amounted to nearly half the crop, and, similarly to our experience in other districts, the cane suffers most on reddish volcanic soils. A fact which Mossman growers have noted, and which also fits in with former observations, is that the damage is usually more severe in fields that carry the highest standing cane at the time of beetle flight. The principal feeding trees of the beetle are the figs and the cocoanut palm, and very probably the guava, on which they have been seen clustering in great numbers. The flight occurs after the first heavy rain in November or early December, and seems to present no unusual aspects.

The frenchi grub does not appear to cause a great deal of damage, although it apparently has not yet risen to feed again after moulting. Wireworms are responsible for very considerable damage to germinating sets, and there appear to be two principal species, one of which is very slender, and the other being shaped more like the typical click-beetle larva. These wireworms were found burrowing all through young shoots under the surface of the ground, and some of the larger ones were boring in the main set like the beetle borer. On one farm over half an acre of plants died off owing to wireworms, and the block had to be replanted.

False wireworms (Tenebrionidæ) occurred commonly in the region of young plants, and were usually found just under the surface of the soil. Whether they were causing appreciable damage, however, is problematical.

The only other pests causing notable damage were moth borers and army worms. Of the former, both the large moth borer (*Phragmatiphila truncata*) and the small ratoon borer (*Ephysteris chersæa*) were much in evidence, and the cause of numerous "dead-hearts" among young ratoon cane. These borers were usually present where weeds were growing through the cane and on the headlands. At one place a curious type of damage occasionally associated with the large moth borer was seen; the caterpillars had gnawed a deep depression through the rind of the stick, and where this occurred the stick would frequently snap off. This was noted in a standing crop of Clark's Seedling, and the injury was as often to be seen at the base of the stick as at the top where the moth borer usually dwells.

With regard to the army worm, several fields of young plant cane had been well stripped, and the fact of the caterpillars having lived in the centre leaves of

the plant and of their main feeding taking place at night, points to the agent being *Cirphis unipuncta*, which is the commonest of the army worms affecting sugar-cane.

Of the minor pests aphides and linear bugs were the only ones occurring in large numbers.

It is intended if possible to fumigate a small plot of grub-infested cane early next year to demonstrate to Mossman growers the efficacy of fumigation as a means of combating the cane grub.

Thanks are due to the Mossman mill staff, representatives of associations, and farmers, who gave every assistance during the visit.

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*The Director of the Bureau of Sugar Experiment Stations has received the following report covering the period September to October, 1929, from the Entomologist at Meringa, Mr. Edmund Jarvis:—*

## Notes on the Oviposition of *Lepidoderma albohirtum* Waterh.

During last December some original research work was carried out at this experiment station in connection with the egg-stage of our "greyback" cockchafer. This interesting study which was commenced at the beginning of the aerial life of the beetle in question, consisted of collecting quantities of living cockchafers from the foliage of their feeding-trees, separating the sexes and confining each female specimen in a suitable cage containing about 16 cubic inches of moist soil, prepared in a manner calculated to induce the captive to lay eggs.

About 500 females were treated in this way between the dates 19th November to 29th December; such collecting—coupled with that of several hundred additional specimens made use of for other experiments during the same period—affording opportunity for acquiring further data on percentages of the sexes in *albohirtum* occurring at different times in the flighting season.

It was found that beetles captured from six to ten days after emergence from the ground oviposited more freely than those which had not been allowed to remain more than three or four days upon their food-plants. Many specimens which had been confined in cages a day or so after leaving the soil died without laying any eggs; these being replaced about a week later by females which had been on the wing for nearly a fortnight. Eggs were first noticed amongst the soil in cages about 12th December, these hatching twelve to fourteen days later; while the total number of tiny grubs procured by this method of rearing was 1,226. During the fourteen days occupied by the egg condition the average shade temperature at our laboratory was 80.25 degrees Fahr.

As a result of investigations made by the writer it appears that tiny grubs of *albohirtum* during their first instar are very easily killed by abnormal earth pressure, such as that brought about by cultivation of the soil in their immediate vicinity. Possibly, sudden pressure of coarse particles of earth on all sides of the body not only tend to prevent movement through the soil but would also be likely to cause more or less injury to the skin, which at this early stage of growth is softer and more delicate than that of grubs of the third instar.

Under natural conditions these tiny newly-hatched grubs enter the soil overhead by gradually tunnelling through the wall of their egg-chamber, so that, during the course of such subterranean progression in compact earth, they would not at any time be subjected to earth pressure.

## Grubs Destroyed by Cultural Operations.

Some years ago, when quantities of grubs were collected from canefields almost every day throughout a period of about seven months (December to June) for experimental work at Gordonvale laboratory, I found that no matter how carefully they were handled during transference from the freshly ploughed furrows to large tins containing moist earth, a fairly large percentage (fifteen to twenty) of apparently healthy-looking and uninjured third-stage grubs did not live more than a day or two in confinement. It was concluded that those dying in this manner had been subjected to more or less soil pressure, or received a severe jar to the body during the breaking up of the ground. An additional number (about 8 per cent) of those which happened to lie close to the path of the plough-share, and were either cut or badly squeezed, died almost at once, and were, of course, left in the furrow after identification of the species concerned.

In a report made by Mr. Tryon twenty years ago (1909) with regard to the occurrence of dead grubs in the Isis district, he points out that a certain percentage

of fatality amongst cane grubs "invariably attends the use of agricultural implements," and that "a number are also injured by simple percussion and bruising without any actual contact having taken place." Needless to say, the opinion of such an authority as Mr. Tryon on this matter is of exceptional value. Seeing that his remarks applied to fully-grown, third-stage grubs of *Lepidoderma albohirtum*, we may rest assured that the mortality noticed by him at the time would have been considerably higher had these larvæ been in the first instar or stage of development.

Common-sense control methods of keeping the soil moving between cane rows as much as possible during those periods taken up by the egg and early larval conditions of our "greyback" cockchafer are within the reach of all farmers, and have already been advocated as being advantageous (Bul. No. 19, pp. 58, 59).

One of the most important factors associated with ideal development of plant life, no matter whether of fruit, vegetable, or sugar-cane, is that of conservation of moisture, and this can only be secured by a systematic cultivation of the upper 3 or 4 inches of soil about a couple of days after each downpour of heavy rain, in order to break up the freshly caked surface and so form a layer of loose, fine earth to act as a mulch and stop evaporation of the moisture lying below it. Each time the ground is disturbed in this manner a certain number of cockchafer eggs or small grubs are likely to be destroyed by soil pressure, &c., while, at the same time, when breaking tunnels containing uninjured grubs, several of these are in danger of falling a prey to ants or other enemies before they are able to barricade themselves against such danger.

In this connection I would also remind growers of a fact, already alluded to in previous monthly reports, that egg-laden female cockchafers are disinclined to oviposit in well-worked soil having a surface composed of loose particles, since such scarabæid beetles, while living under natural conditions, are accustomed to tunnelling into hard ground, which, by affording a kind of fulcrum to work against, enables these insects to maintain a correct position during the course of digging in. (See Bul. No. 19, p. 58.)

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*The Assistant Entomologist at Mackay, Mr. A. N. Burns, has submitted the following report for the month ended 12th November, 1929, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—*

**Greyback Beetles Fully Developed *(Lepidoderma albohirtum* Waterh.*)*.**

Observations made during the past two weeks have shown that greyback beetles are now fully developed and resting in their cells awaiting the advent of favourable rains to enable them to emerge from the ground. The long continued dry season has rendered the ground very hard and dry in many places, therefore the emergence of beetles may not be expected until fairly substantial rains have fallen. On the other hand, if the dry weather should continue for a further few weeks, it will very likely exercise some degree of natural check over this pest in that many beetles may die through being confined in their cells too long.

In the far northern cane areas this form of natural check occurs every few years, but usually after a comparatively small flight of beetles, grub damage the following season is severe. This is explained in the restoration of natural balance—i.e., when an insect is plentiful its parasites are also plentiful, and thus a control takes place; but in seasons of comparative scarcity parasites too are scarce, and so the species tends to increase. This is supplemented by many other factors, such as more equal division of sexes, which produces a greater proportion of fertile eggs, and weather conditions, &c.

Growers are recommended to collect and destroy beetles from feeding trees, also to clear away from headlands and near canefields, any feeding trees. The principal trees that are most attractive to beetles are wild figs (*Ficus* spp.) of all species, Moreton Bay Ash (*Eucalyptus tesselaris*), Blue Gum (*E. tereticornis*), and the swamp "Beetle Tree" (*Philanthus* sp.), as well as wattles or acacias of all species (*Acacia* sp.). Judicious collecting of beetles and clearing out of feeding trees from the immediate vicinities of canefields is a very helpful factor in reducing the numbers of this pest. High grass on headlands and canefield roads is particularly attractive to beetles, and as is usually the case, the ground in these situations is very hard and consolidated which prevents the beetles from entering to lay their eggs in those spots, therefore they enter the loose cultivated ground immediately adjoining. This is not intended to mean that the cane would not be affected at all if the grass was cut down, but high grass is a great attraction to beetles and would no doubt tend to greatly increase the subsequent grub infestation, therefore it may be seen that such precautionary measures are helpful.

**False Wireworms** ***(Gonecephalum carpentariae?* Fam. *Tenebrionidae).***

Many growers may have noticed during the past two or three months large numbers of small, dirty, blackish-brown beetles running about the canefields and headlands. The larvæ or grubs of this beetle are of the "wireworm" type, and are at present very numerous in some canefields in the Mackay district, and several farmers have recently brought under notice their occurrence in large numbers amongst young cane, where they were found to be destroying the buds or eyes on the sets. They enter the eyes and eat out the whole interior, thus producing many misses in the cane. In consequence, many farmers have had to supply parts of their cane, in some cases as many as three times. When supplying by hand, dipping the sets in a solution of sodium arsenite, molasses, and water in the proportions of sod. ars. 1 lb., molasses 8 lb., and water from 8 to 10 gallons, is recommended as a control measure. The dipped sets should be planted wet so that the earth will adhere to them; this soil then becomes impregnated with the poison, thus any insect attacking the sets will first come in contact with a small amount of poisoned soil before actually reaching the set, and will thus be influenced by the solution. The cut ends of the sets will absorb the poison to a depth of a quarter of an inch or thereabouts.

The false wireworm may be briefly described as follows:—When fully grown about three-fifths of an inch in length (1.5 cms.), elongate, and cylindrical. Colour dirty yellowish-brown, the head and first two segments smoky brown, also the anal and pre-anal segment. If seen under a magnifying glass the edges of the anal segment will be seen to have a row of small black bristle-like spines which are slightly curved upwards, bordering its outer edge. The head is small, dark brown, and semi-retractile. The first three body segments each carry a pair of short legs, which are also dirty yellowish-brown in colour. The body is twelve segmented. These larvæ are able to move fairly rapidly on their ventral surfaces; sometimes when dug up they partly curl up and remain motionless for a couple of seconds, or else wriggle themselves with a lashing motion several times before attempting to re-enter the soil. The duration of the larval or wireworm stage of this insect occupies from six to eight weeks during the spring months.

The pupa is a dirty cream colour, and measures about two-fifths of an inch in length (9 cms.). It resembles the adult beetle in shape, with the legs and antennæ neatly folded on the ventral surface, the elytra or wing covers are enclosed in two bud-like processes which are also directed towards the ventral surface. The anal segment bears two fairly long outwardly curved spin-like processes. Just before emergence the eyes darken and the body assumes a dark-brown colour. The duration of this stage is from ten to twelve days, and the pupa is enclosed in a small oval cell in the soil.

The beetles appear to be fond of congregating under rubbish, &c., and heaps of freshly-pulled weeds have been recommended as being effective traps for attracting them. Night time has been recommended as being the best time to remove the beetles from the traps; any thus collected may be destroyed.

**Linear Bugs** ***(Phaenacantha australicus* Kirk.).**

The spring generation of these bugs is now beginning to appear; very small nymphs being observed during the last two weeks. These slender almost mosquito-like active insects are very plentiful in many parts of the district in the late summer months, but it was not definitely known how many broods of this bug were produced in a year.

The presence of very young nymphs at the present time appears to indicate that there are three broods normally—there may be slight overlapping into a fourth brood—but nymphs have now been observed freely during the months of November, January and February, and May and June. Examples bred at the Laboratory have shown that the adults hibernate under cover of trash, &c., during the winter months, eggs are laid about October, the young bugs from them hatching during the latter part of that month and early November. The young nymphs noted in January and February are the offspring from the spring generation, whilst those found in May and June are the brood following the summer generation; these hibernate until the following spring and produce the spring brood.

The eggs are recorded as being dropped loosely and unattached on the surface of the ground; examples caged at the Laboratory invariably laid their eggs singly and attached to various objects, some being laid on the sides of the breeding cage. The eggs are much longer than broad, being a little over 1.5 mm. in length by 0.4 mm. in width. They are of a dark red-brown colour, and the incubation period occupies about twelve days.

This cane insect, although at times very abundant in canefields, has so far not called for control measures; it appears to be fairly free from natural parasites and other enemies. Occasionally, the apices of cane leaves in fields where the bugs are abundant assume a yellowish colour due to the continual drain of sap as a result of the bugs feeding.

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*The Assistant Entomologist, Bundaberg, Mr. R. N. Mungomery, has submitted the following notes for publication, on the emergence and collection of certain injurious cane beetles, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—*

### Beetle Emergence Expected.

During either November or December, as soon as we have received sufficient rain to penetrate to the harder subsoil, we may anticipate the emergence of the various beetles whose grubs attack our cane crops. In Southern Queensland the three worst grub pests with which we have to contend are the Childers, Bundaberg, and "Frenchi" cane grubs, which, of course, result from eggs laid by their respective beetles soon after their emergence and flighting period.

Up to the present our investigations have shown the many difficulties involved in the wholesale collection of female beetles of the two former species, and although further investigation work is in progress, with a view to trapping the females before they can fly away to lay their eggs, past experience in this connection has shown that the number that can be caught is by far too small to have any appreciable effect in diminishing the degree of infestation from year to year. Accordingly, the following remarks on the collection of beetles are not applicable to the Childers or Bundaberg beetles, but concern chiefly the "Frenchi" beetles. In controlling the two former pests, we aim at cleaning the fields thoroughly by hand picking previous to planting, and if the crop becomes subsequently infested, this practice is then supplemented by soil fumigation.

### "Frenchi" Beetles.

"Frenchi" beetles are about 1 inch in length, and less than half an inch at their greatest width. They are of a pale reddish colour, and are covered with whitish scales which give the beetles a silvery lustre. On account of this silvery appearance they have been sometimes erroneously called "greyback" beetles, but it should be here noted that the "greyback" beetle, which does such a vast amount of damage to cane in North Queensland, does not occur here, and therefore to avoid confusion the term "frenchi" beetle should be rigidly adhered to. In collecting this species advantage is taken of certain peculiarities in their habits.

### How they are Collected.

In this case the female beetles fly to low shrubs, fences, and even to the young cane stools, where they are followed by the males, and mating then takes place. The beetles then remain suspended from the objects to which they have flown, and they may be collected without any difficulty. After mating, if unmolested, they may feed on the foliage of such trees as the Moreton Bay Ash, bloodwood, &c., and before dawn they fly back to the canefields to enter the soil and deposit their eggs.

"Frenchi" beetles are not attracted to lights in large numbers like some of the other common beetles, and lights are necessary chiefly as a means of locating and collecting mating pairs. If such collecting is carried out, the collector is assured that equal proportions of the sexes are present, with the additional satisfaction of knowing that every pair destroyed means at least thirty potential grubs less to feed on his crops in the following years. Although the life cycle of "Frenchi" is of two years' duration, there is an annual emergence of beetles, and in some areas there appears to be a larger emergence every second year, with a corresponding heavier infestation of grubs in the succeeding year.

### Where to Look for Beetles.

This year, in some of the sub-districts of Bundaberg, there should be a fairly heavy emergence of "frenchi" beetles, and it behoves growers to collect these beetles as thoroughly as possible in order to minimise damage during the 1930-31 spring and summer. In past years grubs from these beetles have been found on a few farms at Elliott Heads, Avoca, Oakwood, and Gin Gin, and this note of warning is issued with the view that farmers might take the necessary precautions to prevent their fields again becoming infested.

# PATHOLOGICAL INQUIRIES.*

BY J. H. SIMMONDS, M.Sc., Plant Pathologist.

Of the many specimens submitted for report a considerable number are found on opening up to be more or less unfit for enabling a proper determination of the cause of the trouble. This position usually arises from one or more of the three following causes:—

1. The specimens have rotted during transit and are unfit for examination.
2. The portion of the plant in which the causal agent might be found is not included.
3. There is not sufficient data given regarding the general growing conditions of the plant, in which conditions, in many cases, is found the origin of the trouble.

To aid those desirous of seeking advice, a few hints regarding the submission of specimens are given below:—

The method of packing will depend largely on the nature of the specimen and the time that it will take on its journey.

When the parcel may be expected to reach its destination in not longer than two days, the specimens, whether of foliage or fruit, can be wrapped separately in clean newspaper and packed in a cardboard box to avoid crushing. An airtight container must be avoided, as the material sweats and quickly rots under such conditions.

For long-distance consignment, foliage is best pressed between sheets of blotting paper, which can be posted enclosed between two pieces of cardboard. When wishing to send succulent fruit, such as are liable to arrive in a state of decomposition, it is sometimes possible to cut off the diseased portion in a thin layer and send this wrapped in clean blotting paper as in the case of foliage.

When possible, specimens illustrating the disease in all stages, including both early and late symptoms, should be sent.

If the disease consists of a definite leaf or fruit spot, only that portion of the plant affected need be included. However, in the case of diseases of a more general nature, such as a wilt or dieback, it is necessary to forward specimens of the whole plant, including especially the roots. It is always best to include whole specimens when dealing with small herbaceous plants or seedlings.

A covering letter should be sent indicating the date on which the specimens were posted, and stating the nature of the information required. As far as possible, the following details should be included also, to facilitate a correct diagnosis of the trouble:—

(*a*) A short description of the disease as it appears in the field; the varieties of plant affected; the date of first appearance; and nature of subsequent spread, &c.

(*b*) Nature of the soil and subsoil and drainage; details of any manurial application; and date of application.

(*c*) Particulars regarding rainfall, frosts, &c., occurring during the life of the crop.

(*d*) The strength and time of application of any sprays used.

(*e*) Any contributing cause which might suggest itself to the grower.

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

PLATE 195.—CONFERENCE BETWEEN QUEENSLAND WHEAT BOARD AND FLOUR MILLERS, SEPTEMBER, 1929.

*Top* :—Messrs. W. Binns and J. H. Allison.

*Standing* :—Messrs. R. M. White, W. R. Dean, A. C. Krieg, B. C. C. Kirkegaard, R. T. Phelps, J. Archibald, A. Hoskin, E. F. O'Brien, W. D. Phie and J. Canavan.

*Sitting* :—Messrs. W. G. Hamilton (Assistant Crown Solicitor); L. R. Macgregor (Director of Marketing); J. T. Tod, Hon. W. A. Deacon, M.L.A. (Minister for Public Lands); Hon. H. F. Walker, M.L.A. (Minister for Agriculture and Stock); Messrs. R. J. Archibald, G. P. Barnes, M.L.A.; W. H. Luya and T. P. O'Brien,

# RURAL ROUTES IN QUEENSLAND.

## THE WORK OF THE MAIN ROADS COMMISSION.

**The Eighth Annual Report of the Main Roads Commission commends itself strongly to all concerned with the progress of country life in Queensland.**

**This survey of a year's achievements leaves the impression that the Commission is one of the most important factors in our rural development. It is a record of well-organised work, and through the courtesy of the Commission we are able to reproduce the series of excellent plates with which the Report is illustrated, and which indicate to some extent the immense value of a great community service.**—EDITOR.

### THE ROAD AND THE NATION.

ONE of the most important aspects of the history of civilisation is the development of the road for in a very real sense "transportation is civilisation." Writing in the "Edinburgh Review" some time ago, H. J. Randall tells us that "the literature of the road is curiously scanty. It provides the commonest of metaphors, but is one of the rarest of subjects. Poetry, imaginative prose, religion itself, would lose much if they were deprived of such convenient symbols as the broad road, the narrow path, the beaten track, and the accustomed way." And again, civilisation "begins with wandering trails in the dim mists of pre-history; its present stage is the proposal to erect solid structures of concrete reserved for fast motor traffic; between the two lies the material history of mankind." The same writer goes on to remind us that in the story of our race there have only been three periods of deliberate and systematic road making. "The first was the Roman era, and the Romans, according to universal opinion were the greatest of all road builders. The second great period was that of the industrial revolution at the end of the eighteen and beginning of the nineteenth centuries. It transformed England as an agricultural country to one primarily industrial, with agriculture as a subordinate industry. It shifted the centres of population from the wheatfields to the coalfields; from the south and east to the north and west. The sparsely populated areas became hives of industry, and the enormous increase in wheeled traffic threw a burden on the mediæval trackways."

"Telford's masterpiece, the great Holyhead road, will probably endure as long as Watling street; and his unexecuted plan for a great north road may be accomplished in our own days. But about 1830 the 'calamity of railways' fell upon the land, and for the remainder of the nineteenth century there was no great road making; in fact, the roads were comparatively neglected. The third great epoch is the present, dating from the perfection of the motor-car in the last years of last century which has filled our roads as they were never filled before . . . . ."

Writing on the same theme Hilaire Belloc observes that "the Road is one of the great fundamental institutions of mankind. . . . Not only is the Road one of the great human institutions because it is fundamental to human existence, but also because its varied effect appears in every department of the State. It is the Road which determines the sites of many cities and the growth and nourishment of all. It is the Road which controls the development of strategies and fixes the sites of battles. It is the Road that gives its framework to all economic development. It is the Road which is the channel of all trade, and, what is more important, of all ideas. In its most humble function it is a necessary guide without which progress from place to place would be a ceaseless experiment; it is a sustenance without which organised society would be impossible; thus, and with those other characteristics I have mentioned, the Road moves and controls all history."

As a factor in building up the same sort of rural civilisation in Queensland the importance of the Main Roads Commission will be admitted and the following summary of its operations for the year contains much of interest to our readers.

## SUMMARY OF OPERATIONS.

### Road Gazettals and Works.

In the course of the year a length of 619 miles of Main Roads was gazetted, and of Developmental Roads 54 miles, making the total lengths gazetted at 30th June 6,195 and 416 miles respectively.

Road construction as scheduled and as described in the report of the Chief Engineer, has made substantial progress throughout the State during the year.

Several bridges of very considerable magnitude and importance are in hand, such as Macrossan Bridge over the Burdekin River, in Dalrymple Shire, the length of which is 1,188 ft. and width 16 ft.; Halifax Bridge over the Herbert River at Halifax, in Hinchinbrook Shire, the length of which is 950 ft. and width 12 ft.; Burdekin Bridge, between Ayr and Home Hill, the length of which is 450 ft. and width 12 ft., together with extensive approaches over sandy river bed, upon portion of which chain netting is being fixed; Coomera River Bridge on the Main South Coast road, the length of which is 735 ft. and width 20 ft. The river spans of this bridge will consist of broad flanged steel beams, surmounted by a reinforced concrete deck, and resting upon concrete piers founded upon cylinders and pile foundations. The southern approach viaduct consists of timber spans. The bridge should be completed during the early part of 1930, and will relieve the congestion caused by the existing ferry. The Albert River Bridge over the Albert River, in Burke Shire, the length of which is 369 ft. and width 12 ft., is well in hand.

### Development in the North.

Particular reference is made in the Report to roads under construction on the coastal districts of the North and Central area, such as Daintree-Mossman road. Two important bridges have been completed thereon, the one over Saltwater River being a dual-purpose structure which will carry both the sugar-cane tramway and road traffic. Dairying has now been established in the Daintree area, and the construction of the road in question should greatly help to stabilise the industry. This area is the farthest north in Australia in which dairying is carried on. The river flats are carrying one and a-half cows to the acre, due to the rich pastures of marram grass and the heavy annual rainfall of over 100 in.

The dairying industry is being established in two other tropical districts—viz., at Silkwood, near Innisfail—where a start has been made on roads to feed the factory. It is hoped that a vigorous road and bridge construction policy can be continued in the area which has much undeveloped land suitable for dairying and fruitgrowing, quite apart from sugar-cane.

At Mackay a butter factory is in course of establishment, and the Kungurri-Mount Ossa and Calen-Cameron Pocket roads have received considerable attention, which it is also hoped to continue. These roads serve new settlements devoted to sugar, fruit, and dairying.

### A New Link with New South Wales.

The mountain section of Brisbane-Mount Lindesay road, and which is destined to become a most important link with New South Wales, has been completed in Queensland, but the New South Wales section to Woodenbong is yet under construction, having been delayed by wet weather.

Very considerable benefit will accrue to both States when the road is finally opened.

### Kingaroy to Bell.

The completion of the Bunya Mountain section of the Kingaroy-Bell road has removed one of the greatest difficulties to traffic on this important link between the Downs and the Burnett, but the metalling of some miles of black soil in Wambo Shire to Haly's Bore is very necessary, whilst the construction of about 5 miles between Kumbia and Porter's Gap, in Kingaroy Shire, is equally urgent. The necessary bridges over the Boyne River and Mannuem Creek are in hand.

### On the South Coast.

The completion of the Main South Coast deviation leading into Southport is eagerly awaited, but the opening of the first section has alleviated the difficulty of travel between Saltwater Creek and Southport very considerably.

Serious coast erosion has taken place at Currumbin, and steps are being taken to give reasonable access pending the construction of the permanent road, which deviates from the existing road at Currumbin Bridge, and after crossing a spur rejoins the existing road near Tugun.

Considerable expense has been caused by erosion at the Narrow Neck, south of Southport Bridge, but the effect of the brush fences and groynes minimised the erosion to a considerable extent.

### Other Important Highways.

The Brisbane-Toowoomba road construction has proceeded continually throughout the year, and it is hoped that all serious bogs on the road will have been eliminated in another eighteen months.

This road is of a highly useful character to the agriculturist and dairyman throughout its whole length.

Further works on the Clifton-Hirstvale-Grantham road will be completed as far as King's Creek, some miles from Clifton, before the end of the financial year 1929-30. This road, whilst being of great assistance in development of the adjacent area, has a very considerable value as a link between the Downs and Lockyer districts.

A number of important bridges more fully described in the report of the Chief Engineer have been completed and opened for traffic during the year under review, including that over the Don River, near Bowen, 730 ft. long, which gives road access to Bowen Port and Railway to the country on the north bank of the river.

Other completed bridges of importance in the pastoral areas are Bulloo River Bridge, near Thargomindah; Warrego River Bridge, near Wyandra; and Barcoo River Bridge, near Isisford—all of reinforced concrete.

The composite road and sugar tramway bridge over the Haughton River, on the Ayr-Townsville road, has been completed, and withstood a severe flood.

Kolan River Bridge, on the Gin Gin-Miriam Vale road, gives relief from a difficult and often unerossable ford.

The low-level timber bridge and concrete causeway over the Burnett River at Mingo is one of the most important works constructed in the Burnett area this year.

In most instances tenders have been called by Shire Councils whose recommendations are subject to review before approval is granted by the Commission and confirmed by the Minister.

The standard of work which has been achieved is very close to that aimed at in the specifications, and in general the shire officials and Commission's officers are to be commended upon the result.

### Maintenance.

Maintenance works have been carried on over 6,000 miles of road, including the bridges thereon, the total expenditure being £180,596 in 122 local authority areas.

A considerable amount of road-widening has been carried out under this heading on roads in the vicinity of the metropolitan and some of the provincial city areas, owing to the great increase in traffic.

The maintenance of a number of roads is carried out under direct supervision of the Commission in cases where a number of local authorities are interested in the road.

### Road Construction Investigation.

The policy of experimenting with new methods of construction and investigating and trying out various types of road is being continued.

Further experimental sections of penetration macadam roads, using emulsified bitumen and native asphalts in varying quantities and with different treatment, were laid down upon the main Ipswich road.

A small section of the old river gravel on the main Gympie road near North Pine railway bridge was scarified and treated with bitumen, the mixing being carried out by a power grader, and the consolidation being partly by power roller and partly by traffic. The results have been encouraging, and a further section will be laid to confirm the results.

Arrangements have been made for the construction of a heavy trafficked section of the Ipswich road by the Sunderland cement penetration method, particularly with a view to ascertaining the minimum thickness which can be utilised without risk of early failure (a good foundation will be insured).

The Chief Engineer made extensive investigation during the year of road construction in the States of New South Wales, Victoria, and South Australia, the results of which have been disseminated to the staff and shire councils.

### Tourist Roads.

Provision has been made for the declaration, construction, and maintenance of tourist roads upon terms to be agreed upon between the Commissioner and the local authorities concerned, provided that in certain instances no charge might be made to the local authorities—all subject to the approval of the Governor in Council.

It may be mentioned in passing as an example that the Public Highways Department of the Province of Ontario, Canada, estimates the value of the tourist traffic from other countries at £7,000,000 for the year 1926.

### Commissioner's Inspections.

In the course of the year visits of inspection were made to a number of local authority areas, with whose representatives the future road requirements were discussed, and as the result of which plans have been developed. These included Herberton, Tinaroo, Eacham, Cairns City and Cairns Shire, Johnstone, Cardwell, Hinchinbrook, Thuringowa, Townsville City, Dalrymple, Ayr, Pioneer, Sarina, Fitzroy and Livingstone, Maryborough, Burrum, Woongarra, Kolan, Bundaberg City, and Isis.

Plate 196.

Mechanical Navvy in use by the Commissioner on Main Roads Works.

The important decision as to the route of the connection between Bundaberg and Childers was finalised as the result of this inspection.

The Shires of Pine, Caboolture, Landsborough, and Maroochy were visited, and also the whole of the shires south from Brisbane to the Border and westward to the Range.

An inspection through Kingaroy, Wambo, Chinchilla, Taroom, Bendemere, Murilla, Bungil, and Roma was made during the summer, and also the whole of the Darling Downs area.

Visits of inspection to remote areas not included above have been made by senior officers.

It will thus be seen that the Commission is fully in touch with the road needs of the State and the views of the local authorities.

PLATE 197.

UPPER HERBERT RIVER BRIDGE. HINCHINBROOK SHIRE, NORTH QUEENSLAND. LOOKING FROM THE NORTH SIDE.

This bridge has been subjected to heavy flooding without damage.

PLATE 198.

WAMBO SHIRE, KINGAROY—BELL ROAD. CROSSING OF THE BUNYA MOUNTAINS AT PORTER'S GAP.

This important section connects the Darling Downs with the Burnett, facilitating trade interchange between two of the richest provinces in Australia.

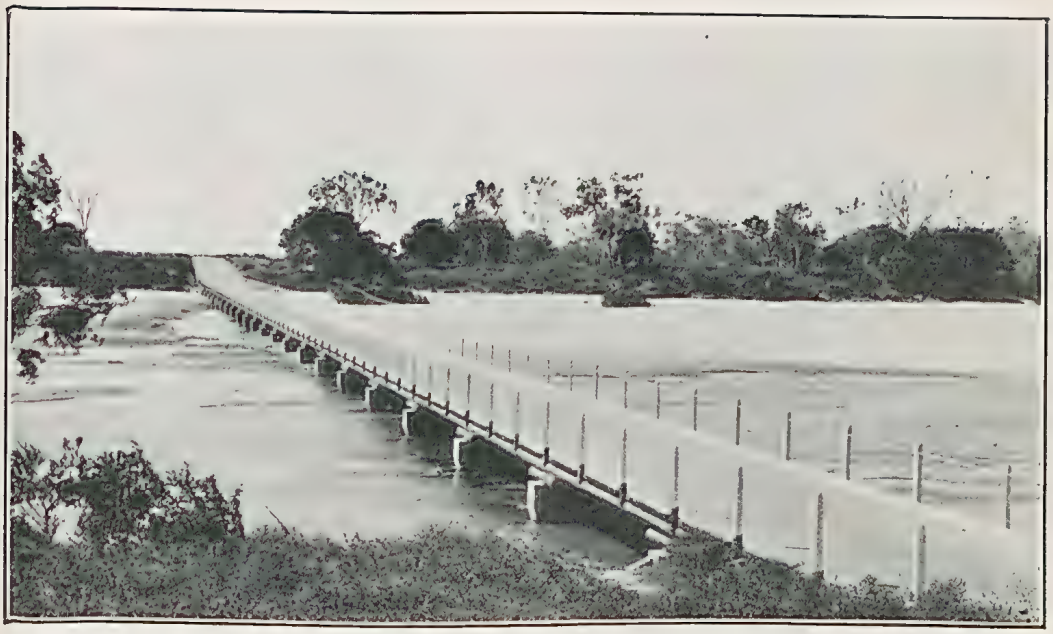

PLATE 199.

WANGARATTA SHIRE. LOW-LEVEL BRIDGE OVER THE DON RIVER, NEAR BOWEN. REINFORCED CONCRETE SUBSTRUCTURE AND TIMBER SUPERSTRUCTURE.

This bridge gives connection to all country north of Bowen. Length, 730 feet; width, 18 feet.

PLATE 200.

THE OLD DON RIVER CROSSING NOW REPLACED BY THE BRIDGE SHOWN ABOVE. THE FLOOD LEVEL REACHES THE TOP OF THE BANK.

PLATE 201.

CUNNAMULLA—THARGOMINDAH ROAD, BULLOO SHIRE. MULTIPLE OPENING REINFORCED CONCRETE CULVERT OVER THE WESTERN CHANNEL OF THE BULLOO RIVER.

A flood section of native bitumen road extends for approximately a mile adjacent to the main Bulloo River.

PLATE 202.

REINFORCED CONCRETE BRIDGE OVER THE MAIN CHANNEL OF THE BULLOO RIVER, ON THE CUNNAMULLA—THARGOMINDAH ROAD AT THARGOMINDAH.

It is interesting to note that this point is almost equidistant from Townsville, Rockhampton, Brisbane, Sydney, Melbourne, and Adelaide.

PLATE 203.

MAIN SOUTH COAST ROAD. PENETRATION BITUMINOUS MACADAM ON THE SOUTHPORT DEVIATION, WHICH ELIMINATES A VERY HILLY SECTION.

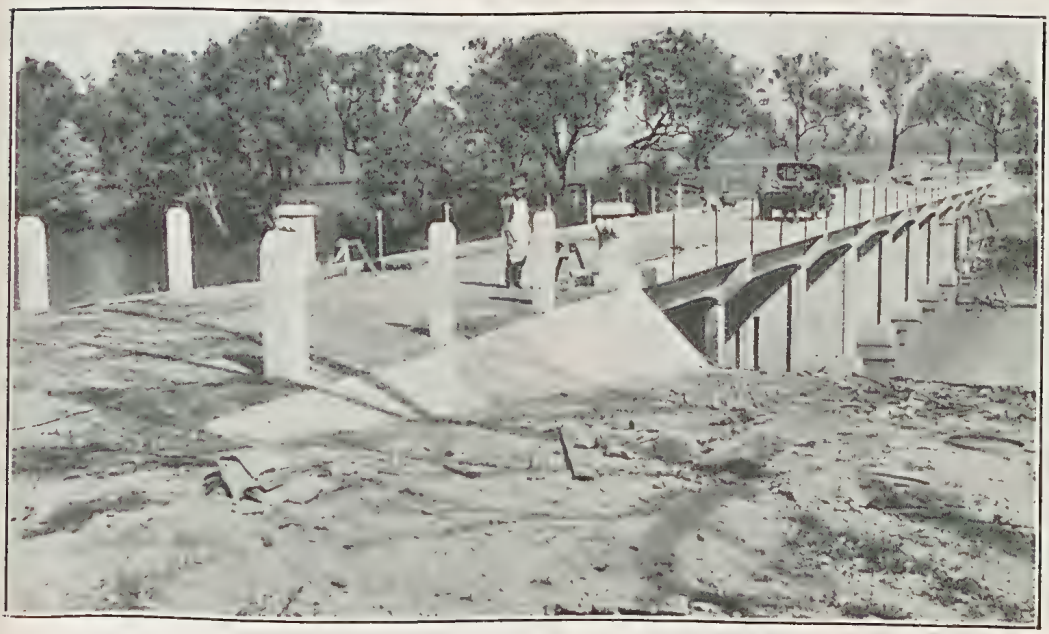

PLATE 204.

REINFORCED CONCRETE BRIDGE OVER THE WARREGO RIVER, AT WYANDRA, WHICH WILL BE OF GREAT VALUE TO PASTORALISTS.

Length, 300 feet; width, 18 feet.

PLATE 205.

PIONEER SHIRE. CUTTING ON KUNGURRI RANGE, ON THE MOUNT OSSA—KUNGURRI DEVELOPMENTAL ROAD, IN THE MACKAY DISTRICT.

This road serves sugar, fruit, and dairy farmers.

PLATE 206.

PART OF MARYVALE FLATS SECTION. FARNBOROUGH—BYFIELD ROAD, IN LIVINGSTONE SHIRE, ROCKHAMPTON DISTRICT.

This road serves a rising fruit-growing district, the products of which are in demand on the Melbourne and Sydney markets.

PLATE 207.

DOUGLAS SHIRE. MOSSMAN—DAINTREE ROAD, NORTH QUEENLAND, LOOKING DOWN ON BARRATT'S CREEK.

The road will serve the most northerly dairying settlement in Australia (latitude 16 deg South), with an average annual rainfall of 80 inches. A coconut plantation is seen in the left foreground.

PLATE 208.

TINAROO SHIRE. ATHERTON—BOAR POCKET ROAD, NORTH QUEENSLAND, LOOKING TOWARDS ATHERTON FROM BRIDGE APPROACHES.

This road and bridge serve a red volcanic dairying area in latitude 17 deg. South

PLATE 209.

WAMBO SHIRE, DALBY DISTRICT. WARRA—INVERAI ROAD. BURNT SHALE PAVEMENT. Serving a good dairying district.

PLATE 210.

CERATODUS—NEW CANNINDAH ROAD, UPPER BURNETT. THREE MOON CREEK, SHOWING CONCRETE KERBING ON A TIMBER BRIDGE.

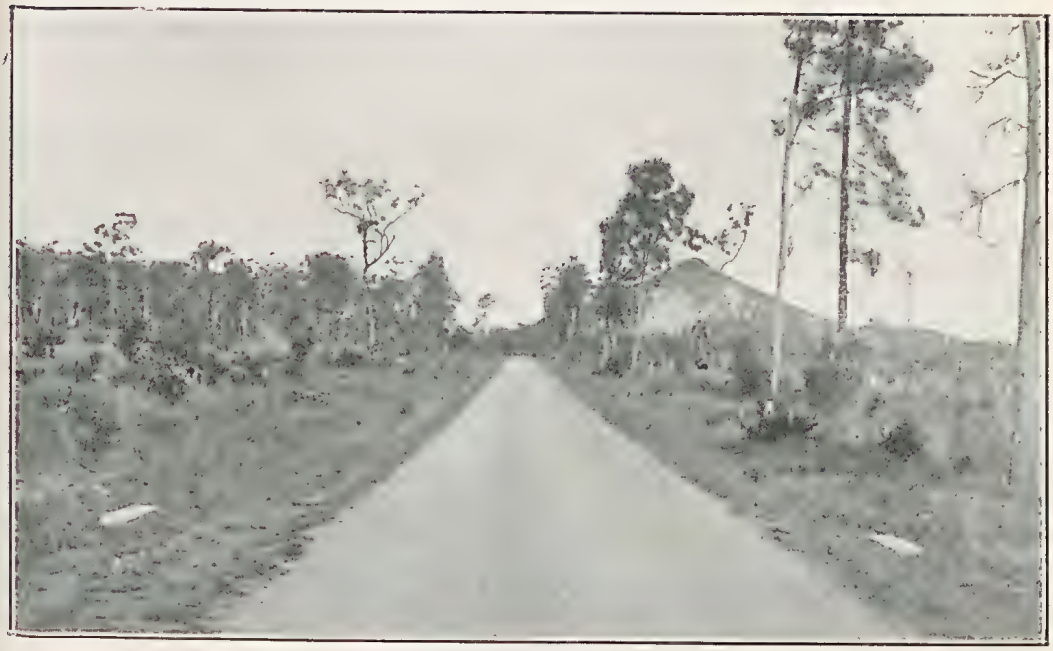

PLATE 211.

CAVES—CHARCOAL SCRUB ROAD, ROCKHAMPTON DISTRICT—SERVING AGRICULTURAL AND DAIRYING SETTLEMENTS. MOUNT ETNA (LIMESTONE) IN THE DISTANCE.

PLATE 212.

LIVINGSTONE SHIRE. SECTION OF CAVES—CHARCOAL SCRUB ROAD BEFORE CONSTRUCTION.

PLATE 213.

MAIN GYMPIE ROAD, PETRIE SECTION. GRAVEL TREATED WITH BITUMEN. FIRST BLADING.

PLATE 214.

MAIN GYMPIE ROAD, PETRIE SECTION. GRAVEL TREATED WITH BITUMEN. SECOND BLADING.

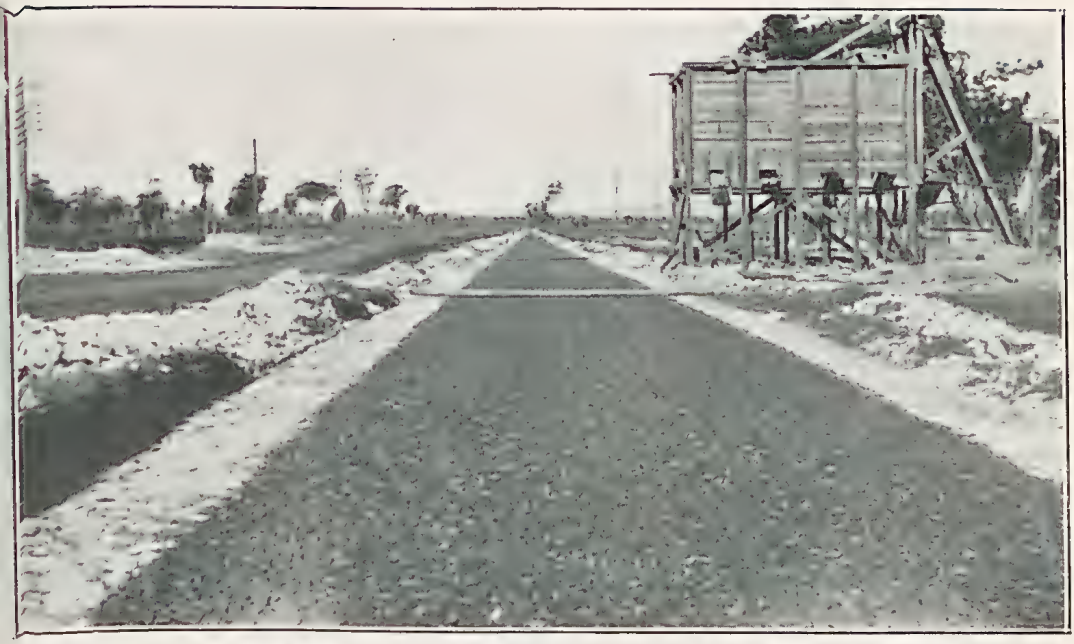

PLATE 215.

PENETRATION BITUMINOUS MACADAM ROAD UNDER CONSTRUCTION AT GATTON ON BLACK SOIL ROAD. THE FLANKING IS LOCAL SANDSTONE, AND THE CENTRAL PORTION BASALT.

The top course had not been completed when the photograph was taken.

PLATE 216.

MAIN GYMPIE ROAD, NEAR BRISBANE. GRAVEL ROAD TREATED WITH BITUMEN.

This is the first experimental section completed in November, 1928. No maintenance to date.

PLATE 217.

BULLOO SHIRE. QUILPIE—EROMANGA ROAD. METALLED ROADWAY OVER SWAMP COUNTRY. This carries traffic from as far out as the South Australian border to the railhead at Quilpie

PLATE 218.

BRISBANE—TOOWOOMBA ROAD. 20-FEET CONCRETE SECTION AT MOOROOKA, NEAR BRISBANE.

PLATE 219.

THALLON—ST. GEORGE ROAD, IN THE BALONNE SHIRE. PARTLY ROLLED INDURATED MARL.

St. George is a thriving township of about 1,200 people, situated in a rich pastoral district distant about 50 miles from the South-Western Railway, and has a fine frontage to a beautiful reach of the Balonne River.

PLATE 220.

PAROO RIVER BRIDGE APPROACHES, SOUTH-WESTERN AREA. THIS FLOOD SECTION IS PAVED WITH PENETRATION TRINIDAD ASPHALT.

PLATE 221.

MURGON—GAYNDAH ROAD. LAMB STREET REINFORCED CONCRETE CULVERT IN MURGON TOWNSHIP.

PLATE 222.

KINGAROY SHIRE. BRIDGE OVER THE BOYNE RIVER ON KINGAROY—BURRANDOWAN ROAD.

# TROPICAL FRUIT CULTURE IN NORTH QUEENSLAND.

By W. J. ROSS, Senior Instructor in Fruit Culture.

NORTH QUEENSLAND, though situated well within the tropics, with its altitudinal differences, possesses a great diversity of climate, varying from hot and moist on the coastal area to the bracing atmosphere of the higher tablelands west of the coastal range. The following notes refer, however, to the narrow strip of country east of the range, between Townsville and Cooktown. The climatic conditions existing within even this area, vary from comparatively arid districts —e.g., between Townsville and Rollingstone—to regions of very heavy rainfall. The most humid portion is that between Ingham and Port Douglas. North and south of these centres the normal precipitations decrease in volume. The rainfall, in regular seasons, concentrated within the early months of the year, varies in different parts from more than 150 inches to less than 50. Precipitations are heaviest under the Bellenden-Ker Range in the vicinity of the Russell River. Cool conditions persist from May to August, the remainder of the year being characterised by the usual tropical summer weather.

## Suitable Soils.

A variety of soils suitable for many agricultural and horticultural purposes, including the cultivation of tropical and sub-tropical fruits, occur within the area. Included in this fertile region is a great tract of land not at present utilised, whilst the best of the remainder is devoted to sugar-growing. In view of the restrictions at present limiting the extension of this crop, economic considerations emphasise the need for the introduction of new, and the furtherance of existing agricultural pursuits in the North. That fruitgrowing on a reasonably extensive scale could assist in this direction is fairly well assured, hence the question: What fruits, other than pineapples and bananas, may be considered to offer commercial possibilities under existing conditions? This discussion therefore will be confined to those tropical fruits whose known characteristics merit serious attention.

## Present Position of Tropical Fruit Cultivation in the North.

Although considerable quantities of bananas, pineapples, and citrus were exported from North to South in earlier times, the development of other varieties of fruit received but scant attention. Excepting the mango, the granadilla, the papaw, and some of the anonaceous fruits—all of which, for reasons discussed later, have not attained to commercial dimensions—little has been accomplished beyond the introduction of odd trees of other fruits. Experimental work has been of a somewhat indeterminate nature, and reliable data concerning the behaviour under Northern conditions of such trees as were introduced is rather scanty. Innumerable mango trees are found growing mostly in a semi-wild state throughout the North, and, generally speaking, the fruit of these is of an inferior quality, containing much fibre and having large seeds. These characteristics of existing North Queensland mangoes explains to some extent why they do not hold a better position commercially, for such qualities do not commend themselves to the Southern taste. Certain types, however, have little fibre and can be used for dessert equally with other fruits, both temperate and tropical. Instances of attention having been given to selection are few though not entirely absent, hence it is that few mangoes are exported to Southern markets. Where selection has been practised—at Bowen, for instance, it has been demonstrated that fruit of good quality and suitable for long distance transport can be grown on a profitable basis. When grown in the North, fruits of both the papaw and the granadilla require to almost mature before picking, hence in the absence of adequate transport facilities the large scale culture of these fruits is at present a hazardous undertaking from an economic viewpoint. The passion fruit (*Passiflora edulis*) also has distinct possibilities. A few trees of the Litchi group introduced to the Mossman and Cairns districts have demonstrated that certain of these grow well and bear fruit under cultural conditions not altogether conducive to best results. The mangosteen has not been fairly tested in the area, but evidence derived from observations on the only bearing tree growing in the old nursery at Kamerunga, warrants attention to the culture of this fruit. As regards citrus, it has been decisively shown that excellent fruit can be successfully produced in several districts, particularly in the vicinity of Cooktown, where, with the aid of irrigation judiciously applied, trees may be made to crop at almost any period of the year.

### Scope for Cultivation—Soils.

Since it has been mentioned that the soils of the tropical coastal area are of a diversified nature, varying from the richest alluvial and scrub soils to those of low fertility found more or less on undulating and flat country, it is considered appropriate for the purposes of these notes to divide them as follows:—

A.—The red and chocolate volcanic soils occurring extensively in what is known as the "wet area" from Ingham to Port Douglas, on more or less elevated country.

B.—The alluvial loams that also occur largely in the "wet area."

C.—The free sandy loams of various colours, either scrub or forest, in areas of lighter rainfall—viz., at Rollingstone and Cooktown.

Almost everywhere these soils possess good natural drainage, a considerable advantage to any projected development of fruit growing in the North. Soils exhibiting any tendency to water-logging or consequent souring during periods of heavy rainfall, had better be passed over in the selection of orchard sites. Deep rooting is a habit to be encouraged in relation to the growing of fruit trees, and unless soil conditions are, or can be made, favourable for its attainment, the location may not be considered as suitable.

### Volcanic Soils.

Group A.—Of the three classes of soils, those in Group A are usually fairly deep, though in some cases covered to a greater or lesser extent with basaltic boulders. The surface soil is friable and the subsoil, as a rule, corresponding in colour with the surface, is usually easily penetrable by the roots of trees. Occasionally subsoils of a compact character are found and such hardly satisfy the standard of conditions generally considered favourable to the production of tree growth. Soils of basaltic origin are usually fertile and in their virgin state covered with dense tropical jungle characterised by a rank growth of lawyer vines amongst timbers, many of which are of high commercial value. These soils are especially adapted for the growth of an extensive range of tropical and sub-tropical fruits. Areas of forest soils or inferior scrub soils may be basaltic in origin, and though scarcely so rich as those bearing dense jungle, when well cultivated, permit the growth of similar fruits.

### Alluvial Loams.

Group B.—These may occur in proximity to rivers and creeks, in extensive flats at bases of mountain ranges, or between them and the coast-line. They figure prominently in the constitution of the richest sugar districts such as Herbert River, Tully, Johnstone River, Babinda, Gordonvale, Cairns, and Mossman. These soils are exceedingly fertile, deep, well drained, and capable of growing any tropical or sub-tropical product tolerant of the prevailing climatic influences—i.e., abundant moisture and humidity.

### Free Sandy Loams.

Group C.—The third series of soils mentioned varies in density from light sandy loams to medium loams. They are well drained and make good fruit soils when subjected to efficient cultivation. They are easy to work and retain moisture well when kept in good tilth. By the addition of green manures and the judicious application of irrigation, excellent results may be obtained from them, especially with citrus and other sub-tropical fruits.

## SELECTED LIST OF FRUITS.

In considering the possibilities of fruits that may be grown commercially, three points have been kept in view, viz.:—

1. That suitable climatic and soil conditions meet the requirements of the plant.
2. That with existing transport facilities the fruit may be marketed without undue difficulty. (See note on Avocado.)
3. That edible qualities should command ready sale in all parts of the Commonwealth.

In compiling the following list as being worthy of consideration in relation to fruitgrowing projects in this area, due regard has been given to the opinions of investigators of these matters in other countries.

**Avocado** ***(Persea gratissima*** **Guertin).**

Tree growth variable according to species, but mostly vigorous. Fruit of many shapes, from oblate to bottle-shaped. Colour light green, dark green, purple, brown, and red. The centre occupied by single large seed. The rind may be thin and delicate to thick and leathery. Edible portion situate between rind and seed, and when properly ripened is of the consistency of firm butter; texture should be smoothe and free from fibre, but many seedling fruits are quite the reverse. Productivity is as variable as other characters mentioned among seedling trees.

*Soils.*—The tree is not exacting in its requirements so long as good drainage is afforded. Loamy soils rich in organic matter (humus) and capable of retaining moisture are preferable.

*Varieties.*—Trapp, Dickinson, Taft, Pollock, Meserve, Murrieta, Solano, Colorado, Lyon, Cardinal, Quality, El. Presidenti, and Puebla.

*Propagation.*—Budding desirable varieties on to seedling stocks resulting from seed taken from well grown fruits off healthy and vigorous trees.

*Carrying Capabilities.*—In some varieties keeping qualities are much better than in others. Thick-skinned varieties are, if of a slow-ripening character, best suited for distant markets. Refrigeration offers possibilities in regard to long-distance carriage.

**Mango (*Mangifera indica* L.).**

Growth strong among seedlings, but not so much so in worked trees. Fruit varies in size and character. Skin smooth, and in some highly coloured, the latter depending on climate in which they are grown. Flesh yellow to orange in colour, juicy and often fibrous in seedlings and inferior budded varieties, but in the best sorts entirely free from fibre; texture smooth and melting, rich and luscious in the best varieties.

*Soils.*—Sandy loams capable of retaining abundant moisture.

Varieties.—Alphonse group—"Bennett," "Amini," "Cambodiana," "Pairi." Mulgoba group—"Haden," "Mulgoba." Sandersha group—"Sandersha." Philippine type—"Carabao," "Pico." Bowen type—"Kensington Pride," "K.P.A." (H. B. Lott.).

*Propagation.*—Shield budding desirable varieties and top-working inferior kinds.

*Carrying Capabilities.*—Reasonably good when properly treated and packed.

**Mangosteen** ***(Garcinia mangostana*** **L.).**

Tree of medium size, slow grower, and slow to produce fruit. Fruit round, 2½ to 3 inches in diameter. Rind thick and tough; colour dark purple to almost black. Edible portion surrounding seeds in centre of fruit consists of a white substance of delicious flavour.

*Soil.*—The mangosteen prefers a rich, moist, and well-drained soil, and sheltered locations in districts of great humidity.

*Propagation.*—Offers a field for experiment in relation to budding, grafting, and air-layering to hasten fruiting.

*Varieties.*—Available stocks are Garcinia Xanthocymus, Garcinia Mestoni, and Garcinia Gibsi, the latter two being indigenous to the Bellenden-Ker and Booje areas, North Queensland.

**Litchi** ***(Litchi chinensis*** **Sonnes** ***Nephelium litchi*** **Bailey).**

A handsome tree of medium size. Fruit about the size of a small plum, produced in loose bunches; the translucent, pleasantly acid, juicy aril, enclosing seed, is contained in a red, warty, thin shell. Of good quality eaten out of hand or dried.

*Soils.*—Deep loamy soils rich in humus in areas of heavy rainfall and humidity.

*Propagation.*—Grafting, air-layering, and by seed. Budding should be tried. Stocks: Litchi and Loongan (Euphoria longana).

*Carrying Capabilities.*—Reasonably good with refrigeration. Fruit can be preserved or dried. Imported into the Commonwealth in latter form.

*Varieties.*—(Indian) "Bedana," "McLean's," "Rose" (Chinese), Lohmaichi.

**Rambutan** ***(Nephelium lappaceum* L.).**

Tree vigorous and erect. Fruit resembles the Litchi in character. Borne in clusters, shape oval, 2 inches long, covered with soft fleshy spines. Colour red, sometimes orange-yellow. The outer covering of fruit from which the spines arise is thin and leathery, and when removed exposes a white translucent juicy aril which adheres to an oblong-pointed flattened seed. The flavour is acidulous, suggesting that of the grape.

*Soil.*—Deep rich loams, well drained, in moist hot areas.

*Varieties.*—Malayan and Ceylon.

*Propagation.*—Similar to the Litchi.

**Brazil Nut** ***(Bertholletia excelsa).***

Large growing tree. Fruit large, containing eighteen or more nuts.

*Soil.*—Rich deep loams and scrub soils in areas of abundant rainfall and great humidity. Imported into the Commonwealth.

## THE STATE NURSERY, RUSSELL RIVER.

The institution of an Experimental Station on Russell River is an important step towards the development of tropical fruit culture. The economics of production in connection with land settlement warrants attention to research. In order that such research should have economic and practical value, a broad field of operations should be provided to admit of experimental work in relation to plant production, including propagation, acclimatisation, plant breeding, soil investigations, and protective work in relation to diseases and pests. That there is a field offering for investigation of stocks and scions is generally recognised, especially in the case of the mangosteen. The introduction of plants and the testing of them under North Queensland conditions presents an important aspect, as it would furnish tangible evidence on the possibilities of successfully producing many tropical products in this area. Plant-breeding is an inviting field for the production of new, resistant, and more productive varieties. It is obvious that a research and experimental station could assist very largely in the development of tropical fruit-growing, especially of those fruits discussed in these notes.

## SUMMARY.

1. The areas suited for the growth of tropical fruits are outlined.

2. Suitable soils are classified and necessary modifications on cultural procedure with each fruit considered.

3. The fruits with potentialities are listed and include Mango (*Mangifera indica* L.), Avocado (*Persea gratissima* Guertin), Mangosteen (*Garcinia mangostana* L.), Litchi (*Litchi Chinensis* Sonnes), Rambutan (*Nephelium lappaceum* L.).

4. The functions of an experimental and research station at Russell River in relation to these fruits are discussed.

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# SUBSIDIARY INDUSTRIES FOR WESTERN QUEENSLAND.

By WILLIAM LESLIE, Assistant Instructor in Fruit Culture.

The time seems opportune for the consideration of other means of utilising land in Western Queensland. The success attained by the Prickly-pear Commission is setting free large areas, some of which are already cleared of pear and on which ringbarking is proceeding, particularly between Warra and Miles.

Several kinds of economic plants deserve attention in this regard, including:—

## Fruit.

The cultivation of citrus fruits might well be extended to this region, because the finest quality of oranges, mandarins, and lemons can be grown and are being grown. Grapes of the finest quality do very well, and with a largely increased production a dried fruits industry might be established. Olives are already growing well on a small scale in Western Queensland, and the date palm also thrives there. There is a risk, however, in some districts of fruit trees and vines being attacked by white ants.

## Fodder Trees.

In this comparatively dry area it seems reasonable to look to fairly deep-rooted edible trees and shrubs as a stock food standby.

A tree which has claimed attention recently is the carob bean (*Ceratonia siliqua*). It has been observed thriving and fruiting in isolated places in the West,* and indications point to its fitness for withstanding a prolonged dry spell. It yields an abundance of sweet pods and it is for the sake of these that it is cultivated in the Mediterranean region, and large quantities are imported into the United Kingdom as a concentrated cattle food. The pods could probably be desiccated and the seeds extracted readily. It could probably be best grown in the form of groves or wide shelter belts. The latter could be formed on the boundaries of paddocks and securely fenced to prevent the trees being injured and the pods, as they fall, being eaten by stock. Deep sandy soil, preferably on a ridge, would probably be most suitable. Trees could be planted at about 15 feet apart in rows 30 feet apart with a view to cutting out alternate trees in the rows in later years as required. The only cultivation appearing necessary after clearing and planting would be to run a disc cultivator between the rows several times a year and so keep down weeds and maintain subsoil moisture. The seedlings do not transplant readily, but a system of sowing a few seeds at each peg, *in situ*, might prove successful. The first crops would consist of few pods, but as the trees grow older increasing quantities would be harvested.† They could be raked off the ground and put in bags or if desiccating machinery were available they could be carted off loose to the machine. The desiccated pods could probably be readily stored in bags or in large tanks like maize. Some special use might be found for the seeds.‡

If this tree could be cheaply and extensively grown in Western Queensland, it would probably prove of immense value to the grazing industry. Seeds of this tree have already been distributed on a small scale and several stockmen are interested.

## Fibres.

Among fibre-yielding plants there are some which are reputed to be drought-resisting. The Sisal Hemp (*Agave rigida var sisalana*) is one, and from isolated instances it would prove hardy and prolific. A number of plantations could be grouped round a factory in a position where water would be available for retting the leaves and washing the fibre. It might also be possible to extract the fibre by a dry method. The freshly cut leaves might be dried in the sun before being sent to the factory.

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* Crystal Brook, via Bowenville, Mr. R. H. Fuller. Guluguba, Wandoan Line, Mr. P. F. Stiller. Palm Grove, Guluguba, Wandoan Line, Mr. E. W. Stiller.

† 800 to 900 pods per tree (Chamber's Encyclopedia).

‡ The bark and leaves of the Carob are used for tanning (Ibid.).

Several species of Bowstring Hemp (*Sansevieria*) might also be exploited. Some species have leaves of a succulent nature and are likely to be drought-resistant. With Queensland-grown fibre available, rope and sack-making might be considered as economic possibilities.

### Rubber.

The only rubber-yielding tree which would be likely to adapt itself to the climate of Western Queensland is *Manihot Glaziovii*—the Ceara rubber tree. It is reputed to thrive in dry barren soil on the east of South America. It is tuberous-rooted to some extent, indicating the possibility of its being drought-resistant.

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## THE BANANA INDUSTRY.

### PREVENTION OF THE SPREAD OF DISEASE.

The Minister of Agriculture, Mr. H. F. Walker, announced recently that a special committee of the Provisional Banana Industry Protection Board had been at work during the preceding week on the North Coast. Among matters that engaged attention was the investigation of the practicability of establishing a buffer area by the eradication of all bananas in a suitable strip of territory in the hope of preventing the spread of Bunchy Top northwards to disease-free districts. The committee traversed the area between Eumundi and Nambour, and reports that in the region between Eumundi and Yandina there are approximately 150 growers, and between Yandina and Nambour approximately seventy growers. The probable cost of compensation to banana-growers would be from £25,000 to £50,000 apart from the cost of eradication. The effect of eradication would be to create a buffer area of not more than 10 miles wide. According to scientists there is considerable doubt as to whether a buffer area of this width would be sufficient to achieve the objective with a reasonable guarantee of efficacy. Having regard to all the considerations the full board has endorsed the committee's finding to the effect that a buffer area in the locality in question must be regarded as impracticable.

The board has recommended, however, that intensified inspection be provided for in the northern part of the area of slight infection and the southern part of the area which is believed to be free from Bunchy Top. It also recommends that special inspectors be located in the Buderim and Hunchy area, in the district between Nambour and Yandina, and in the territory between Yandina and Eumundi. The latter two districts are believed to be free from Bunchy Top, and the first mentioned is one in which Bunchy Top is present. Active steps are being taken to clean up the area already affected. Certain properties in the hands of the Agricultural Bank have been thoroughly cleaned, and growers are being called upon to do their part in eradicating the diseased plants on their properties. With the advent of the summer rains the danger of the spread of the disease is greater than in winter, and it is desired to do everything possible to control the disease and prevent its further spread northwards. The idea underlying intensified inspection in the two special districts between Nambour and Eumundi is to enable the immediate detection of any spread of the disease into clean territory.

The Minister also stated that he had arranged for the immediate carrying into effect of the recommendations of the Provisional Board. He added that the board had found that the past practice of giving an order for the cleaning up of diseased plantations within ninety days from the date of the issue of the order by inspectors had been taken advantage of unfairly by growers who, in many instances, deferred action until the end of the period, and even then, in some cases, allowing the ninety-day term to expire without undertaking the eradication or cleaning-up work required. Henceforward eradication orders would be limited to a period of twenty-eight days with power to the board to grant an extension, provided there was reasonable evidence that during the initial period of twenty-eight days the grower had made a reasonable effort to do what was required.

Mr. Walker stated further that, as the banana industry is of very great value to the State, every possible endeavour should be made to protect it. He hoped that it would be possible for the board to secure the co-operation of growers without the necessity of taking legal proceedings for breaches of the regulations. Such proceedings, however, would have to be taken against owners of plantations whose properties constituted a menace to the industry as a whole.

# RURAL LIFE IN OTHER LANDS.—VII.

By the EDITOR.*

## JOURNEYINGS IN GERMANY.

IN our last talk we gave some consideration to the development of agriculture in Germany. We showed that this was largely due to improved methods of agriculture, more intense cultivation, and closer attention to the economics of agriculture. For purposes of convenient comparison we took the production figures of Great Britain and placed them side by side with the figures of German output. This comparison showed that the volume of production was in favour of the German farmer; but we were also careful to point out that the difference was accounted for by the fact that in Great Britain the lesser volume of production was due, primarily, to so much more arable land being allowed to go into and remain in grass than was the case in Germany, and not to any superiority in skill and methods employed by the German farmer. As a matter of fact, in this respect, in my opinion, the British farmer more than holds his own, and as a live stock breeder particularly, as everyone knows, he has no superior. The comparative lesser volume of output in Great Britain was secondarily due to causes, economic and otherwise, which it is not our purpose at the moment to discuss. It is proposed now to give some time to a consideration of one or two of the economic phases of German agriculture, particularly in relation to co-operative associations, in respect to which I was able to make some small inquiry during my short stay in Germany.

### Co-operative Sale of Live Stock.

One thing that impressed an enquirer particularly was the extent to which the co-operative principle is applied by the German producer to the sale of live stock. A study of available literature† helped one to understand this.

While the beginnings of the modern co-operative movement may be traced to the middle of last century, the co-operative sale of live stock only dates from the eighteen-nineties. Co-operation in this form was forced on the German farmer as a consequence of serious difficulties encountered in live stock dealing and in meat distribution.

In the rural districts the butcher buys his fat stock direct from the farmer. Direct purchase is not, however, possible in the large towns and industrial centres, where the demand for meat is enormous. Live stock dealing had become essential, and the trade had come increasingly to employ agents, while the live stock was sold on the markets by commission salesmen. In the larger cities a new intermediary element was introduced, the wholesale butchers coming into the market as buyers and slaughtering to sell to the retail dealers according to their individual requirements and extent of custom. Thus, in order to reach the consumer from the producer, the meat passed through the hands of the agent, the dealer, the salesman, and the wholesale and retail butchers. Such a system naturally created difficulties, due largely to the fact that the producer lost whatever influence he might have on the sale of his own produce. In particular, the small farmer was completely at the mercy of the dealer, who was favoured especially by the circumstance that, if losses were to be avoided, the producer's stock which was ready for market had to be sold at once. The fact, too, that the market price was known by the dealer before the farmer knew it was a further cause of trouble; there were no means of finding out precisely the prices actually paid, and the market reports were not always quite reliable.

Although money-lending in connection with live stock dealing—a curse in the Rhine Provinces and also in Hesse—had been checked effectively by the action of the co-operative societies, the dependence of the small occupying owner on the dealer continued, though he was not fully aware of the fact. On the other hand, the interests of the consumer were also disregarded by the live stock dealer, who in this case also made full use of his power.

These difficulties have a ring of familiarity to the Queensland farmer; as a matter of fact, they are common to most countries. The price of many of the most important articles of food is often determined by chance, want of means, and a system that, in practice, is often quite unfair. A well-considered organisation of the live stock trade along enlightened lines has not been very evident anywhere.

Other difficulties were noticed in Germany which, on occasion, provided some striking examples of disorganisation in respect to the disposal of rural products. No co-operative activity has ever been spared the "ailments of babyhood"; it must go

* In a Radio Address from 4QG.

† International Review of the Science and Practice of Agriculture.

through its teething and measles periods. That was our experience in Queensland, and it was no less so in Germany. In the co-operative sale of live stock mistakes were made and heavy handicaps carried. The trade waged an extraordinarily keen fight against the co-operative societies, and used every available weapon. The co-operative movement constituted a challenge to the existing order, and the challenge was accepted immediately. Large sums were sacrificed by the dealers with the object of defeating the farmers' efforts to control their own industry. Unfortunately, bad faith among the co-operators, a condition of disloyalty with which we are quite familiar, proved a valuable auxiliary to the trade in its war on the co-operative sale of cattle. The societies had to embark upon a direct campaign in which the main argument was that co-operation is based on the proper discipline of the members, and the farmer cannot shake off this painful dependence on the middleman except by a cheerful acceptance of the obligations he owes towards his co-operative society and his fellow farmers. But, despite all the difficulties in the way, these societies eventually by efficient service won through to success.

## Price Regulation.

The importance of the local societies for the sale of live stock was shown in their influence in regulating prices and the stand they took against trade manœuvring and manipulation. For example, to quote one instance, after the formation of such a society in one district in Germany from which all the fat stock were sent to Berlin, the prices paid to the farmers went up 25 to 30 per cent. in consequence of the competition set up with the dealers.

The object of the co-operative sale of live stock was first and foremost to check unfair trade and to eliminate the superfluous middleman. But there were also wider aims, among them being the desire to secure to farmers a proper influence in price movements which had hitherto been dominated wholly and solely by the trade.

These co-operative societies developed remarkably up to the outbreak of the Great War. The war and war economy schemes put an end to the unrestricted co-operative sale of live stock, and the societies were merged in the general war economy organisation.

After the war, in October, 1920, the industry was decontrolled. Checks to free productive activity were removed, but the scarcity of all goods and the depreciation of the currency, with all its consequences, made co-operative selling difficult.

## Growth of the Co-operative Idea.

The co-operative idea generally has gained much ground in Germany, as shown by the large increase in the number of co-operative societies in recent years. The number of co-operative live stock societies, for instance, has risen from 228 before the war to well over 400.

In the time at my disposal it has only been possible to touch the fringe of this interesting subject, but a closer study of this phase of agricultural organisation in Germany would, I think, well compensate for the time devoted to it. To sum up, in respect to co-operative live stock selling, the German farmers found that their work demanded the employment of a staff with high professional and technical qualifications. As I have pointed out before in a similar discussion, brains had to be matched with brains. To fall below their standard of efficiency was simply to court defeat, and that the German farmer could not afford. It was also found that a staff with purely business experience only was not sufficient. The staff must be permeated with the co-operative idea, and must bring to bear co-operative influence as strongly as possible in order to maintain the movement in full vigour; otherwise co-operative selling would become a mere counterpart of the trade, and the co-operative societies themselves would lose their economic and social character which made them so valuable in the national interest.

The difficult economic conditions of the present day demand the displacement of all unnecessary middlemen. That was the feeling among the German farmers, from what I could gather. In that respect it seemed to me that their viewpoint was identical with our own. It need not involve unreasonable claims on the part of the co-operative movement, nor any failure to recognise the right of honest trade to exist. There is plenty of scope for the activities of both, and the monopoly of either is a thing, I think, to be avoided. As in all co-operative work, the object of co-operation cannot be fulfilled unless individual farmers understand the necessity of maintaining in their own interest, and by means of active personal support, the institutions set up by their own industrial organisations. In effect co-operation means simply good discipline and good order.

### A Word for Queensland.

If time had permitted I should have liked to have said something about what one was able to learn of the workings of the co-operative banks established by agricultural co-operative societies in Germany, and also something of their remarkable system of instruction in farm household economy. As regards farm household economy, however, for evidences of efficient instruction we have no need to go beyond the borders of Queensland. Our own State-wide system of public instruction, departmentally and otherwise, which, by means of travelling domestic science and technical instruction cars and rural schools, take the technical college from the city to the farm, compares, in my opinion, very favourably with similar systems, the operations of which I was able to observe in a necessarily restricted way, in the older countries of Europe which it was my good fortune to visit.

### Back Through Rhineland.

Continuing our journey along the Rhine we passed on to Mayence, through Rheingan, a rich and beautiful district which produces some of the most famous wines of the world; past the Niedervald, clothed with vineyards at the point where the celebrated river quits the Rheingan, on to Wiesbaden, the famous watering place, surrounded with productive orchards and vineyards and beautiful public gardens.

The extraordinary exploitation of natural mineral waters in Wiesbaden and in Germany generally set one thinking of the possibilities of our own artesian wells in this regard. Looking ahead one can easily imagine the great asset Queensland will have in its bore waters, apart altogether from their inestimable value for stock purposes. For the moment I am thinking of the wells at Dalby and Muckadilla which—and this is only a layman's opinion—warrant far wider advertisement than they have yet received.

It was interesting to pass Rolandseck again and revive the memories of its tragedy; to pass the rock of Lorelei; the castle of Stolzenfels with its many turrets and beautiful oriel windows; to come to Boppard, where the river curves again and the ranges recede, giving a view of fair fields, fertile wheatlands, and vine-clad slopes; to pass St. Goar and the wonderful mediæval castle of Rheinfels, where the river broadens out into a lake-like expanse; to pass Bacharach, the island on which an old fortress stands and where, in the bad old days, all the ships that went by were compelled to pay tribute; and arrive at Mayence or Mainz, at the junction of the Main and the Rhine, a great commercial and manufacturing city in the midst of gardens and vineyards. It was there, in the reign of Augustus, the old Roman Mussolini, that Drusus drove in his tent pegs.

### The Black Forest.

Having come so far, an excursion to the Black Forest, the home of history and legend, both weird and beautiful, could not be missed. The Rhine forms its natural boundaries on the south and west, its eastern mountain ranges are bordered by the plains of the Neckar, while its northern limit is marked by Baden Baden.

One can get to the heart of the Black Forest from a town called Freudenstadt, a place with something like 15,000 people, and situated on one of the outer mountain ridges. From there the railway descends into one of the most beautiful valleys of the whole region. There is a country where life may be observed in all its rustic simplicity, a community disturbed very little by modern discoveries and inventions, a remnant of the ancient Swabian race, whose political importance is long lost. There one found a people holding to much the same customs as their fathers and grandfathers did back through the centuries. The dominant impression of this district, which covers an area of something like 2,000 square miles, is of the forest which crowns every hill and borders every valley. It has no large towns, no large estates, and therefore no splendid country houses that are such a delightful feature of rural England. But there is scarcely a valley or mountain that has not furnished a legend or a tale of romance and high adventure to German literature.

From high up on one of the crests the silvered surface of a mountain lake reflects the castle on its opposite bank, while beyond and below lies the Rhine Valley, dotted with villages and tiny homesteads, and away in the distance, beyond Appenweier, the cathedral tower of Strasbourg, veiled with smoke and haze. To the east an array of mountain peaks, divided by deep valleys, break the skyline, while a little to the right some of the peaks of the distant Alps are faintly seen, while the great ranges of the Black Forest extend in parallel ridges to the south.

A short journey south-west of a place called Baierstrom brought us to the head of the Murg River and to the famous high road celebrated during the wars of the French Revolution. This road, paved and graded to bear the heaviest artillery, and extending for miles along the crest of the highest mountain ridge, connects the Rhine Valley with the Neckar.

Apart from the Forest itself, one of the most striking features of this part of Southern Germany is the magnificent system of country roads.

The average home of the Black Forest farmer exhibits the utmost in domestic economy. Furniture and conveniences are reduced to the limit of necessity. The same roof which protects the family shelters the live stock, hay, grain, and farm implements. Neither youth nor age exempts the women and girls from man's labour on the farm. One could see young girls alongside their grandmothers swinging the scythe to rhythmic measure. But the beauty of their country is beyond description, especially as we saw it in those days of a glorious June, when we were to go from the devastated fields of Northern France to the green meadows and murmuring streams in those delightful forest-bordered valleys in Southern Germany, and also to mark the grim and painful contrast. And so we took leave of a delightful province in Germany and its industrious and kindly people.

Though in this series it has only been possible to skim the surface, one finds that though much may be learnt from even such a fleeting observation of rural conditions in Germany, a strong impression remains that in general and economic progress in which points of similarity exist, the Australian farmer can well hold his own.

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## ON THE AIR.

### LIST OF AGRICULTURAL LECTURES.

Following is a list of lectures on rural subjects which will be broadcast by the Queensland Radio Service from Station 4QG, Brisbane, from 2nd December until 31st January, 1930:—

Monday, 2nd December, 7.45 p.m.—"The Battle of the Breeds," by Mr. E. J. Shelton.

Tuesday, 3rd December, 7.45 p.m.—"Poultry," by Mr. P. Rumball.

Wednesday, 4th December, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 5th December, 7.45 p.m.—"Our Rural Resources," No. 2, by Mr. J. F. F. Reid.

Wednesday, 11th December, 7.45 p.m.—From the Queensland Agricultural College.

Monday, 16th December, 7.45 p.m.—"Marketing Pigs," by Mr. E. J. Shelton.

Tuesday, 17th December, 7.45 p.m.—"Sheep and Wool," Department of Agriculture and Stock.

Wednesday, 18th December, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 19th December, 7.45 p.m.—"Our Rural Resources," No. 3, by Mr. J. F. F. Reid.

Monday, 23rd December, 7.45 p.m.—"Christmas Day on the Pig Farm," by Mr. E. J. Shelton.

Tuesday, 31st December, 7.45 p.m.—"A Talk on Poultry," by Mr. J. J. McLachlan (Assistant Instructor in Poultry Raising).

Thursday, 2nd January, 7.45 p.m.—"An Organised Rural Industry," No. 1, by Mr. J. F. F. Reid.

Wednesday, 8th January, 7.45 p.m.—From the Queensland Agricultural College.

Monday, 13th January, 7.45 p.m.—"Prospects for the Pig Industry in 1930," by Mr. E. J. Shelton.

Tuesday, 14th January, 7.45 p.m.—"An Organised Rural Industry, No. 2, by Mr. J. F. F. Reid.

Wednesday, 15th January, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 16th January, 7.45 p.m.—"A Talk on Poultry," by Mr. P. Rumball.

Wednesday, 22nd January, 7.45 p.m.—From the Queensland Agricultural College.

Monday, 27th January, 7.45 p.m.—"Autumn Crops for Pigs," by Mr. E. J. Shelton.

Tuesday, 28th January, 7.45 p.m.—"Sheep and Wool," Department of Agriculture and Stock.

Wednesday, 29th January, 7.45 p.m.—From the Queensland Agricultural College.

Thursday, 30th January, 7.45 p.m.—"An Organised Rural Industry," No. 3, by Mr. J. F. F. Reid.

# CLIMATOLOGICAL TABLE—OCTOBER, 1929.

Supplied by the Commonwealth of Australia, Meteorological Bureau, Brisbane.

| Districts and Stations. | Atmospheric Pressure. Mean at 9 a.m. | Shade Temperature. | | | | | | Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Means. | | Extremes. | | | | Total. | Wet Days. |
| | | Max. | Min. | Max. | Date. | Min. | Date. | | |
| *Coastal.* | In. | Deg. | Deg. | Deg. | | Deg. | | Points. | |
| Cooktown | 29·98 | 85 | 75 | 89 | 28 | 72 | 6, 7, 10 | Nil | .. |
| Herberton | .. | 83 | 57 | 91 | 25 | 47 | 9 | 58 | 2 |
| Rockhampton | 30·02 | 86 | 65 | 96 | 28 | 54 | 1 | 207 | 7 |
| Brisbane | 30·05 | 79 | 60 | 88 | 27 | 53 | 23 | 258 | 10 |
| *Darling Downs.* | | | | | | | | | |
| Dalby | 30·02 | 84 | 54 | 95 | 28 | 43 | 23 | 137 | 7 |
| Stanthorpe | .. | 73 | 48 | 85 | 8 | 38 | 23, 27 | 361 | 7 |
| Toowoomba | .. | 75 | 53 | 87 | 28 | 43 | 23 | 326 | 6 |
| *Mid-interior.* | | | | | | | | | |
| Georgetown | 29·92 | 97 | 65 | 102 | 27 | 56 | 3 | 46 | 1 |
| Longreach | 29·94 | 95 | 64 | 104 | 24 | 48 | 11 | Nil | .. |
| Mitchell | 30·00 | 86 | 54 | 97 | 18 | 43 | 23 | 75 | 3 |
| *Western.* | | | | | | | | | |
| Burketown | 29·93 | 94 | 69 | 102 | 21 | 62 | 16 | Nil | .. |
| Boulia | 29·97 | 92 | 55 | 106 | 23 | 46 | 11 | Nil | .. |
| Thargomindah | 29·99 | 85 | 61 | 101 | 17 | 52 | 10, 26 | Nil | .. |

# RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of October in the Agricultural Districts, together with Total Rainfall during 1929, and 1928, for Comparison.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Oct. | No. of Years' Records. | Oct., 1929. | Oct., 1928. | | Oct. | No. of Years' Records. | Oct., 1929. | Oct., 1928. |
| *North Coast.* | In. | | In. | In. | *South Coast*—continued: | In. | | In. | In. |
| Atherton | 0·85 | 28 | 0·22 | 0·07 | Nambour | 2·91 | 33 | 5·64 | 0·72 |
| Cairns | 1·80 | 47 | 0·15 | 0·05 | Nanango | 2·28 | 47 | 2·63 | 1·26 |
| Cardwell | 1 92 | 57 | 0·21 | 0·13 | Rockhampton | 1·79 | 42 | 2·07 | 1·26 |
| Cooktown | 1·01 | 53 | 0 | 0 | Woodford | 2·43 | 42 | 2·97 | 0·78 |
| Herberton | 0·87 | 42 | 0·58 | 0·04 | | | | | |
| Ingham | 1·51 | 37 | 0·07 | 0 | | | | | |
| Innisfail | 2·83 | 48 | 0·30 | 0·08 | | | | | |
| Mossman | 2·68 | 16 | 0·89 | 0·34 | *Darling Downs.* | | | | |
| Townsville | 1·23 | 58 | 0·12 | 0·62 | | | | | |
| | | | | | Dalby | 2·02 | 59 | 1·37 | 1·07 |
| *Central Coast.* | | | | | Emu Vale | 2·17 | 33 | 2·14 | 1·60 |
| | | | | | Jimbour | 1·88 | 41 | 2·00 | 2·25 |
| | | | | | Miles | 1·96 | 44 | 1·78 | 0·27 |
| Ayr | 0·95 | 42 | 0 | 0 | Stanthorpe | 2·53 | 56 | 3·61 | 1·83 |
| Bowen | 1·04 | 58 | 0·93 | 0·04 | Toowoomba | 2·55 | 57 | 3·26 | 1 85 |
| Charters Towers | 0·67 | 47 | 0·38 | 0·19 | Warwick | 2·27 | 64 | 3·50 | 1·55 |
| Mackay | 1·75 | 58 | 0·08 | 0 | | | | | |
| Proserpine | 1·81 | 26 | 0·56 | 2·09 | | | | | |
| St. Lawrence | 1·79 | 58 | 0·13 | 3·21 | *Maranoa.* | | | | |
| | | | | | Roma | 1·74 | 55 | 1·41 | 0 |
| *South Coast.* | | | | | | | | | |
| | | | | | | | | | |
| Biggenden | 2·23 | 30 | 2·08 | 0·49 | | | | | |
| Bundaberg | 1·98 | 46 | 2·39 | 0·45 | *State Farms, &c.* | | | | |
| Brisbane | 2·56 | 78 | 2·38 | 1·30 | | | | | |
| Caboolture | 2·47 | 42 | 2·59 | 1·44 | Bungeworgorai | 1·39 | 15 | 0·77 | 0·25 |
| Childers | 2·40 | 34 | 5·72 | 0·27 | Gatton College | 2·01 | 30 | 2·73 | 1·39 |
| Crohamhurst | 3·28 | 36 | 5·09 | 1·53 | Gindie | 1·41 | 30 | 1·04 | .. |
| Esk | 2·45 | 42 | 4·05 | 1·79 | Hermitage | 1·87 | 23 | .. | 1·26 |
| Gayndah | 2·34 | 58 | 3·77 | 0·44 | Kairi | 0·96 | 15 | 0 | 0·28 |
| Gympie | 2·69 | 59 | 3·06 | 2·25 | Mackay Sugar Experiment Station | 1·49 | 32 | 0·56 | 0 |
| Kilkivan | 2·60 | 50 | 4·48 | 3·14 | Warren | 2·02 | 14 | .. | 0·47 |
| Maryborough | 2·64 | 57 | 4·06 | 0·48 | | | | | |

GEORGE G. BOND, Divisional Meteorologist

## CORRECTION.

In our reprint from "Hansard" in our last issue of the second reading speech of the Minister of Agriculture and Stock, Hon. Harry F. Walker, on the Diseases in Plants Bill, certain errors, due to an original mistake in the transcript, appeared.

The pink boll worm was obviously confused with the boll weevil, from which Queensland cotton fields are fortunately free.

On page 520 of the November Journal, in the last sentence at the bottom of the page and continuing on page 521 and thereon for two more sentences the Minister is reported to have said:—

"When cotton was introduced here and the question of ratooning came up, it was a debatable question whether the boll weevil, commonly called the corn-ear worm, which attacks similar plants, backed up by many other weevils, was responsible for enormous loss, and in some parts of the world would not practically annihilate the industry here. Through the care of the farmers in Queensland we are now producing cotton almost free from the diseases which affect many other countries. When cotton was produced in the Lockyer district the boll-weevil almost wiped it out."

Those sentences should have read:—

**"When cotton was introduced here, and the question of ratooning came up, it was a debatable question whether the pink boll worm and the pest commonly called the corn-ear worm, which attacks cotton and many crop plants, backed up by other insects, which have caused severe losses in other parts of the world, would not practically annihilate the cotton-growing industry here. Through the care of the farmers in Queensland we are now producing cotton free from many of the pests and diseases which exist in many other countries. When cotton was first produced in the Lockyer district the boll worm, or corn-ear worm, almost wiped the industry out."**

*Photo.: E. Gottke.*]

PLATE 223.—MONSTERIA DELICIOSA, GROWN BY MR. BARLOW BLAIKE, YEPPOON.

# WORMS IN SHEEP.

## DRENCHING TESTS.

By J. CAREW, Instructor in Sheep and Wool.

In the course of the last few seasons losses of sheep, caused by stomach and intestinal worm infestation, have occurred in many districts in Queensland. Most of the losses sustained were among weaners, but sheep, both wethers and ewes, up to and including full mouths, were also lost in large numbers. Many growers complained that after giving the usual drenches to control stomach worms, the sheep did not show any improvement, consequently they blamed the drenches used and tried new ones. In most obstinate cases investigated it was found that besides the ordinary stomach worms (*Strongylus contortus*) found in the fourth stomach there were also several bent-head round worms in the large intestines. These are very difficult to dislodge owing to the strength of any drench being diminished or absorbed in its passage through the stomachs and small intestines before reaching these worms, which occupy the cæcum close to the colon.

Drenching under the most favourable circumstances necessitates a considerable amount of extra work and expense as well as being hard on the sheep. If they are wormy and given a good drench they improve quickly, but if given a drench that will not kill even the worms in the fourth stomach much work and expense is incurred without any benefit.

### Tests at Milmerran.

In order to test some of the recognised drenches in use, and check up on other recent introductions for which satisfactory results were claimed, forty-eight sheep were selected from the wether flock on a property near Milmerran, which were yarded on the evening of 7th October last.

On 8th October they were formed into six groups, each group being branded with a distinguishing mark and dosed between 12 and 2 p.m. The mixing of ingredients, the preparation of drenches, the dosing of each group, and the post-mortem examination was carried out in the presence and with the assistance of Messrs. Euston King, S. Goodsen, and P. J. Bailey.

Group No. 1 was drenched with a 2 fluid ounce dose of a formula containing 2 oz. avoir. arsenic and 5½ lb. Epsom salts to 5 gallons of water. One sheep from this group was killed twenty-four hours after drenching, which on examination showed several stomach worms (*Strongylus contortus*) alive and a few dead in the abomasum or fourth stomach. Several bent-head round worms were found alive in the large intestines. Most of these were located, as is usual, in the cæcum close to the colon.

Forty-eight hours after drenching another sheep from this group was killed. No stomach worms dead or alive could be found in the fourth stomach, but numerous bent-head round worms were found alive in the large intestines. During the test these sheep showed no difference in appearance to the control sheep on the first day, but were better and brighter on the second day.

Group No. 2 was drenched with a 4-oz. dose of a formula containing 1 lb. bluestone, and 1 lb. mustard to 10 gallons of water. One sheep from this group was killed twenty-four hours after drenching which showed a few stomach worms alive and several dead in the fourth stomach. Several bent-head round worms were found alive in the large intestines. The coating of the fourth stomach was somewhat inflamed, but the group was normal as compared with the control lot.

Forty-eight hours after drenching another sheep from this group was killed. Examination revealed no worms dead or alive in the fourth stomach, which showed no signs of inflammation. Some bent-head round worms were found alive in the large intestines.

Group No. 3 was drenched with a 2-oz. dose of a formula containing 2 oz. arsenic, 5½ lb. Epsom salts, and 8 oz. bluestone to 5 gallons water. The sheep which was killed from this group twenty-four hours after drenching showed no worms in the fourth stomach either dead or alive, but a few stomach worms were found dead in the bowels. Bent-head round forms were found both alive and dead in the large intestines. The lining of the fourth stomach was found to be inflamed. This group appeared to be more tucked up and weakened as compared with other groups and controls.

Forty-eight hours after drenching, another sheep from this group was killed which showed no stomach worms dead or alive in the fourth stomach. There was

no sign of inflammation on the lining of this stomach, which appeared quite normal. A few bent-head round worms were found alive in the large intestines. This group was much improved and quite equal in condition to any of the other groups.

Group No. 4 was dosed with 5 cubic centimetres of a formula composed of two parts carbon tetrachloride to three parts of paraffin oil. One sheep from this group killed twenty-four hours after dosing showed large numbers of stomach worms alive in the fourth stomach, but no dead worms could be found. Another sheep from this group was killed forty-eight hours after dosing, when only a few worms were found alive in the fourth stomach. Several bent-head round worms were found alive in the large intestines. The dose was given with a syringe fitted with a long nozzle which was inserted behind the tongue before being ejected, the mouth of the sheep being held open by an assistant. Immediately following the administration of the dose the sheep generally coughed in distress, but no evil effects followed and all the sheep in the group compared at par with other groups. A double dose was given to one sheep without causing any noticeable difference during the test, but was not killed to ascertain results.

Group No. 5 was dosed with 5 cubic centimetres through a syringe fitted with a long nozzle. The formula was prepared by Mr. Brünnich, Agricultural Chemist. One sheep from this group killed twenty-four hours after dosing was found to contain large numbers of dead stomach worms in the fourth stomach and a few alive. Some bent-head round worms were found alive in the large intestines, but appeared very "dopey." Forty-eight hours after drenching another sheep from this group was killed, when a few stomach worms were found alive and a few dead in the fourth stomach. A few bent-head round worms were found alive in the large intestines. The space where these worms are usually found was free, which would indicate that they had been passed out, although no dead worms could be found.

A double dose of this mixture was given to one sheep of this group. Twenty-four hours after dosing this sheep looked distressed and distended, forty-eight hours after dosing he was on a par with the remainder of the sheep in this or any of the other groups.

Group No. 6 was branded but received no treatment. This group was kept with the sheep which were treated in order to check up on them during the test. These sheep showed about the same as the best of the treated groups twenty-four hours after the other groups had been dosed, but did not brighten up to the same extent during the following day. Forty-eight hours after the other groups were dosed two sheep from this group were picked out to be slaughtered. The first one killed was in good condition, one of the best in the flock and suitable for mutton. On examination several stomach worms were found alive in the fourth stomach. The intestines did not show many nodules or lumps, while the bent-head round worms in the intestines were very few as compared with all other sheep examined. The second sheep killed from this group was in poor condition and similar to those killed from the treated groups. In the fourth stomach large numbers of stomach worms were found, the contents showing a seething mass. Nodules on the intestines were very numerous, while in the large intestines the bent-head round worms were very numerous.

In all the sheep killed a fair quantity of sand was found which may have been taken in while eating short grass from sandy ground, but usually the wormy sheep will lick up earth of some description and, incidentally, the control sheep that showed the greatest number of worms contained the greatest quantity of sand.

Twenty-four hours after drenching the weather turned very cold, and when the sheep were turned out they looked hollow and miserable. Early in the night it commenced to rain, yielding 35 points. It would have caused no surprise if a few of the weaker sheep, and especially those that received a double dose, had died during the night, but their quick recovery and bright appearance was very noticeable when brought to the yard at midday.

## Summary.

As a result of the tests the arsenic and Epsom salts had killed only a few stomach worms at the end of twenty-four hours, but no living worms could be found at the end of forty-eight hours after drenching. The worms in the intestines were not affected.

The bluestone and mustard had killed nearly all the stomach worms at the end of twenty-four hours, and no worms could be found alive in the fourth stomach after forty-eight hours. The effect on the intestinal worms was not distinct or decided.

The arsenic, Epsom salts, and bluestone formula acted quicker than either of the above. Besides killing all the stomach worms within twenty-four hours it also killed many of the bent-head round worms in the intestines. By the appearance of the lining of the fourth stomach the dose is rather strong.

The carbon tetrachloride seemed to be quick in its action on the sheep when administered, but slower than either of those drenches containing bluestone in killing the stomach worms. No effect was apparent on the intestinal worms.

Mr. Brünnich's mixture showed the greatest number of dead worms in the fourth stomach twenty-four hours after dosing, although a few were still alive forty-eight hours after dosing.

Bent-head round worms were very "dopey" twenty-four hours after dosing, but as the dead worms were very difficult to find under the conditions prevailing, a definite kill could not be determined.

It will be noticed that the ingredients in Mr. Brünnich's mixture is not set out. As this is the first occasion on which it has been used by this department the test was only a trial which will act as a guide for further experiments.

Owing to the difficulty to correctly determine the result of the two drenches which acted on the intestinal worms, arrangements were made to carry out further tests in order to secure more definite results.

## DRENCHING TESTS AT YEERONGPILLY.

Later tests were carried out at the Yeerongpilly Stock Experimental Station and following are the results:—

Eleven sheep were secured from the same flock at Milmerran. The sheep were drenched on 26th October and taken off good grass just prior to drenching. They had no water for sixteen hours.

Sheep No. 1.—Formula: 30 grams dichloro benzol, 100 cc. paraffin. Dose 5 cc., with a long-nozzled syringe. Post mortem forty-eight hours later revealed several stomach forms alive in the fourth stomach and bent-head round worms in the large intestine.

Sheep No. 2.—Drenched 26th October. Formula same as above. Dose, 10 cc. Post mortem seventy-two hours later. Several stomach worms alive in the fourth stomach, also bent-head round worms in the large intestines.

Sheep No. 3.—Formula: 30 grms dichloro benzol, 20 cc. benzol, 20 cc. petrol, 40 cc. castor oil. Dose, 5 cc. Post mortem seventy-two hours after dosing revealed both stomach and bent-head round forms alive in large numbers.

Sheep No. 4.—Formula: 20 grms dichloro benzol, 30 cc. benzol, 20 cc. croton oil, 60 cc. paraffin. Dose, 10 cc. Post mortem seventy-two hours after dosing. A few stomach forms were found alive in the fourth stomach, also a few bent-head round worms in the cæcum. The contents of the fourth stomach was below the usual quantity and soft, while the contents of the small and large intestines were also soft and contained much mucus.

Sheep No. 5.—Formula: 2 oz. (avoir.) arsenic, 6 lb. Epsom salts, 5 oz. bluestone, 5 gallons water. Dose, 2 fluid ounces. Post mortem seventy-two hours later. A few stomach worms were found alive in the fourth stomach. Bent-head round worms were found in the cæcum, but not in large numbers. Those which were present were not close to the colon as is usual, which would indicate that the drench had dislodged at least some of them. On this occasion the sheep were on good grass, which was green and carried a heavy dew during the early hours on the day they were drenched.

To secure the most reliable results a further batch of three sheep were selected and placed in a loose box at 4 p.m. on the 31st October. They were without food or water from then until 11 a.m. on the 1st November, when they were drenched with the following:—

Sheep No. 8.—Formula: 30 grms dichloro benzol, 100 cc. paraffin. Dose, 10 cc. Post mortem revealed plenty worms alive in fourth stomach. Worms of two varieties, specimens of which have been taken. Sheep killed seventy-two hours after drenching.

Sheep No. 9.—Formula: 20 grms dichloro benzol, 30 cc. benzol, 20 cc. croton oil, 60 cc. paraffin. Dose, 10 cc. No worms anywhere, dead or alive. Experiment chiefly remarkable for very inflamed membrane of fourth stomach and big gut. Consider that, recollecting seventy-two hours had elapsed since drenching, inflammation excessive and possibly dangerous.

Sheep No. 10.—Formula: 2 oz. arsenic, 6 lb. Epsom salts, 5 oz. bluestone, 5 gallons water. Dose, 2 fluid ounces. Many dead worms of two varieties in fourth stomach. No live worms. No live worms in either the fourth stomach or in the large intestines. No indications of inflammation. A fact to note in connection with this sheep was the extremely black blood when killing. This is not associated with the drench, but merely the fact is noted.

The cost of the different drenches is a matter of much importance as also is the time of preparation and the convenience of administration.

The cost of the ingredients to make sufficient arsenic and Epsom salts drench to dose 1,000 adult sheep would be approximately 4s.

This mixture must be boiled until the arsenic is dissolved, which generally takes about three-quarters of an hour. To add 5 oz. of bluestone to this drench would increase the cost to 4s. 6d. per 1,000 adult sheep.

Two and a-half pounds each of bluestone and mustard are required to drench 1,000 adult sheep at a cost of about 9s.

Carbon tetrachloride, two parts, and paraffin oil three parts, mixed together and given in a five cubic centimetres dose works out according to the price of the materials used at 20s. per 1,000 adult sheep.

The mixture which was used, as prepared by Mr. Brünnich worked out at a low cost, but as he is still working on it, for the purpose of further tests, the final results will be decided when these tests are completed.

*Summary of the Yeerongpilly Test.*

When the sheep were allowed on good grass up to the time of drenching the results were not so satisfactory as when starved from eighteen to nineteen hours at Milmerran, and in the case of sheep No. 10 at Yeerongpilly.

The quantity of bluestone in the arsenic and Epsom salts was reduced from 8 to 5 oz., at which strength it proved more satisfactory against both stomach and bent-head round worms than any other drench tried.

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## CATTLE BREEDING AND MANAGEMENT.

By H. ANNING, Wetherby, via Richmond, Queensland.*

When the cattle which have just been banged, drafted, and delivered have been turned out and started well away, "Algy's" job is to hand the bullocks over to the drover, after first of all taking the ages and jotting them down. The drover takes them out to his camp, and starts herding them. It is handy to know the ages of the bullocks which are being sent away. These can be given to the agents to hand on to probable buyers, who will know just what they are going to inspect.

The drover who knows his work will hang up a lighted lamp on a tree in the yard. Bullocks get used to this, and look for it on the road, as it means a camp for them, and they will walk straight for it at night, round up and lie down. It seems to have a steadying effect on them as well. The object of having the bullocks well away from the branding yard is because the grass all round for a mile or so will be trampled down during the delivery, and it is essential that bullocks get a decent feed and drink every day, as then by the time they are ready to go on the road they will have been thoroughly broken in, and no trouble to handle. A good drover loves the job of herding bullocks, and "Algy" will find the extra expense of holding them preparatory to starting may be reflected later in the price he gets.

While in hand they will be fed down to the camp on the main creek, or probably there may be two camps, and these can be utilised week about. Of course, they will not be driven over the same bit of country each day. By the time they get back at night, they will be content to go straight in, find their night's camp and lie down, after a heavy sigh, and not stir again till daylight. Every day they get a bit quieter, and will let the drover ride through them without taking any notice. Of course, the fresh bullocks coming in every day stir them up a bit, but these soon settle down.

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*In the "Pastoral Review" for September. (Previous notes by the same writer were reprinted from the "Review" in the July issue of the "Queensland Agricultural Journal.")

When 1,000 are in hand it is time to start them south. In case of pleuro showing, it is essential to inoculate, which, properly done, speedily knocks the disease out of them. No doubt the bullocks will be headed for the nearest market, offered for inspection and sale on the road, and if not sold it is a good plan to offer by auction at a good centre after classing them. Failing that, it is well to get a bit of good agistment, let them freshen up and sell when rain creates a better demand. Exactly the same procedure is followed with the second lot.

It is always a relief to get a mob well away with a good drover. So many things can happen, and if they start rushing for any reason that makes things bad. Rushing (which American cattlemen call stampeding) is one of the worst and most nerve wracking businesses imaginable. It can start in a dozen different ways, but usually it commences with the bullocks getting a sudden start. They all jump up, panic-stricken, and start galloping. It generally ends (the first time) with "ringing," the cattle galloping around and around in one place till the ground is all cut up like a ploughed field. In some herds cattle can be counted on to rush for certain. Where they are run about and speared by blacks they are generally bad. Blacks run them into bogs, up blind gorges, and over rough country. What cattle escape never forget the experience, and the slightest thing starts them at night.

Since the bullocks keep rushing every time a mob is mustered, often a wing gets away, and these are mustered the following year, and being roguish start the next mob going, and so it continues from year to year. The longer cattle in hand rush the more terrified they get of one another. Many are killed, others are lamed, their horns knocked off, and it is most difficult to know what to do. If they start on the run the best thing is to box them up with a lot of mixed cattle, watch them in a good open place, and build a lot of fires around them. Mixed cattle won't rush like bullocks, and they act as a brake on operations. If they rush much at night, they want a long spell in the day. On watch, the men want good night horses and whips. Every time the bullocks rush off camp they should be flogged back to it. After a while they get to understand they musn't leave the camp.

On watch the more noise the men make the better. Bush classics like "The Wild Colonial Boy," "On the Banks of the Reedy Lagoon," and "The Branding of the Bunyip" may be sung to popular accompaniments. It helps to steady the cattle, keeps the men awake, and helps to educate newchums. Getting off to replenish fires (which should be kept burning freely) men must be warned not to get between the fire and the cattle, as the gigantic shadow suddenly thrown over the sleeping mob may cause a bad rush. One has to be careful when striking matches, especially on a dark night, and it is best to use a firestick. Plenty of light, good music, and good feed and water by night, and the cattle may settle down.

I remember one enterprising youth who had joined up with a rushing mob, saying to his boss who was taking a pack-horse into town for some sundries, when asked if he wanted anything, replied: "I'll get you to get me an accordeon to play on me watch—that'll quieten 'm down a bit." "Oh, I'll get you a peanner," responded the boss, and the youth understood and kept quiet himself in future.

Cattle are most dangerous when all are lying down (or nearly all). There are generally two or three standing, and when these lie down others get up. Cattle accustomed to rushing ofter give utterance to one or more "shivers" before jumping up. It can hardly be described, and must be heard to be appreciated. It is something like an electric thrill, which runs through the whole mob. It also runs through horse and man on watch. Old night horses know it, and prick up their ears at the deadly ominous murmur (although it can hardly be called a murmur), and one can feel their hearts thumping the saddle flap. They are all keyed up for an instantaneous start and a midnight gallop. Sometimes, after a few shivers, the cattle settle down and camp. Some drovers ride in amongst them, and stir them up, as cattle are not so likely to rush when moving about.

Few things make a man realise his pathetic futility more than a big rush on a dark night in timbered country. Everything may be peaceful, when a stick cracks, or the sudden flare of a match starts them going. In a split second they are off. The trained night horse races immediately for the leaders. He loves the game, even if the rider does not. The peaceful scene of a second before is changed to one of wild uproar, with men shouting and yelling, whips cracking, horses galloping, and high over everything the roar of the rush, as a thousand panic-stricken, maddened bullocks take a beeline through the timber, smashing undergrowth, tearing up trees, and crippling, maiming, and killing one another.

One advantage has the man on watch, and only one. His horse can gallop faster than the cattle, and he will, if the rider lets his head go. He can't see anything, but the horse will take him to the lead, and swing round with the leaders

as soon as they are turned. Once on to the leaders the man must use his whip and try and swing them around. Once turned, they must be kept going back, as fast as they have left, if possible. It sounds easy enough on paper, but it must be remembered that the bullocks, under the influence of panic, will go anywhere, and the horse will surely follow, through scrub, over holes and antbeds, gullies or creeks—where a fall means sudden death—as the cattle will keep galloping straight ahead. If the men on watch are able to swing the mob around quickly (and time is surely the essence of the contract here), and flog the cattle straight back to camp, and do this each time, it seems to cow the bullocks, and in a while, after a few shivers, they will merely jump up and surge around the camp.

It is no harm, even then, to let the whips speak, and the bullocks will feel and know they can't get away, and it seems to give them more confidence in the watchers and in themselves. Rushing is simply fear of something unknown, and it speedily develops into fear of one beast for another. Old bullocks are hard to check, but young ones are not so bad. It is a bad business with either, though.

## CAUSE OF LOW PRICES.

The prime cause of low wool prices is the high cost of the finished article, says the "Sydney Mail." There can be no doubt about that. If woollen clothing could be purchased cheaply enough it would sell without the slightest difficulty—and it is not the growers who are making the big profits out of it. Where are they going? Apparently there is an unreasonable rake-off between the manufacturer and the user. If that could be appreciably reduced there would be little need for a "use more wool" campaign. The same argument applies in the case of meat. For years now stockowners have been pointing out that the retail price of both beef and mutton is out of all proportion to the prices they are paid for their fat stock. Prices in the wholesale market conform with reasonable closeness to stock values, but after that there is a big difference.

With prices down for wool, and the mutton export markets disorganised, this disparity becomes of greater moment to producers. Obviously the bigger the disparity the more difficult it is for producers to get reasonable prices. A rise of 2d. or 3d. a pound in the wool market should not make any substantial difference to the ultimate consumer, but with our present costs of distribution it apparently does. The stating of the problem is easy, but the solving of it is difficult.

## SOME CORRIEDALE HISTORY.

The origin of the Corriedale breed of sheep is usually credited to New Zealand, says the "Australasian" (Melbourne), but perhaps the first colonist to conceive the idea of establishing a fixed crossbred type of Lincoln-Merino was a South Australian pioneer. In the year 1872 Dr. Browne had some correspondence with the wool supply committee of the Bradford Chamber of Commerce in reference to his sheepbreeding operations at Moorak. Dr. Browne claimed to be the first in Australia to use the pure Lincoln with a Merino ewe, and one letter went on to say—"I sent them out in 1858, and even that is not sufficient time to produce a regular flock of any considerable number. But that it is possible all my efforts assure me, and I fully believe that I shall continue to grow long wools finer and with more lustre than any I have had the honour of submitting to your inspection. I have a stud flock sufficiently large to breed from by crossing one with the other, and the result of such breeding is to increase the lustre and not diminish the length of the fleece or the size of the sheep. . . . I use the longest fleeced and largest Merino ewes to put with the old, glossly-fleeced Lincoln ram. Hundreds of Merino ewes from this flock when dressed by the butcher weigh 80 lb. and more. The small Merino ewe has great difficulty in bearing to the pure Lincoln ram. The lamb is too large. So that if a breeder cannot get large Merino ewes he should begin with a Lincoln and Merino cressbred ram, and put the Lincoln ram with the increase. The Merino ewe possesses extreme fineness of fibre compared to the Leicester, and another valuable quality—closeness. This my Moorak sheep have in a great degree beyond the English Leicester, consequently you are correct in advising me to continue the use of the pure old lustrous Lincoln ram."

# MALNUTRITION.*

By J. C. BRÜNNICH, Agricultural Chemist.

A GREAT majority of our pastoralists had during the last few years a very serious setback on account of drought conditions, and therefore it became necessary to give some advice as to how such conditions may be mitigated, by drawing attention to mistakes made by many and beneficial results obtained by others through the use of licks, &c., during the past season.

The great aim of all animal husbandry is increased production, and this again depends almost entirely on the feeding of stock. Any errors in the feeding will cause malnutrition and disease.

## Food Constituents.

Every one is familiar with the chief constituents of foods, which are—

(1) Proteins, nitrogenous compounds, the important flesh-forming nutrients;
(2) Carbohydrates (as sugar, starch, &c.) and fats, all nitrogen-free compounds which build up fatty matter and produce heat and energy;
(3) Mineral matters, which enter into the formation of bones, teeth, blood, and other fluids of the body; and finally
(4) "Vitamines," accessory foodstuffs of which very minute quantities are required for a complete maintenance of health and normal development of the animals, and generally well supplied in green pasture.

The requirement of mineral matter or salts received but very scanty attention until recent times.

The fact that all foodstuffs contain certain amounts of mineral matter, left in the form of ash when fodders are burned, was well known, and it was generally accepted that any animal fed in a natural way on common ordinary rations like grass, hay, and grain, would receive a sufficient amount of the mineral constituents with the food, which supplied the necessary amounts of proteins, fat, and carbohydrates for its maintenance and growth.

In all living matter the following inorganic constituents are found:—The non-metallic elements—Phosphorus, sulphur, siticon, chlorine, iodine, and fluorine. The metallic elements—Potassium, sodium, calcium, magnesium, iron, manganese, and aluminium; and probably traces of several other elements.

It is a false idea to think that the minerals are required for bone formation only. The inorganic constituents are as essential to animal life as the ordinary organic food constituents, proteins, fat, and carbohydrates. The most important function of the food minerals are performed in the soft tissue and in the blood, where they are essential constituents of living matter, and therefore they stimulate and control directly or indirectly all vital processes.

## Functions of Mineral Constituents.

The chief functions of the mineral constituents performed in the animal body are the following:—

1. They are necessary for the maintenance of a proper physiological balance between the mineral elements in the body fluids. Any excess or deficiency of any one of the mineral constituents will affect the vital processes. A deficiency of potassium in the blood will act on the heart muscle and prevent it from relaxing properly, while an excess makes it relax so much that it stops beating. Common salt is an absolute necessity for nutrition, but given in excess will act as a poison and cause serious troubles. The mineral constituents maintain the practically neutral reaction of the blood.

2. They are necessary for the process of digestion. The digestive processes are affected by acidity and alkalinity of the digesting fluids. In the stomach an acid reaction must exist to aid in the pepsin digestion, whereas in the small intestine an alkaline reaction is necessary to allow the trypsin to act. The absorption of the digested products again is controlled by the concentration of the salts, and this concentration will also affect the passage of digested and undigested material along the intestines.

3. Mineral constituents are required as constructive material for the formation of new tissue and building up of the bone skeleton.

4. Milking animals require larger supplies of mineral matters to keep up the yield and average composition of the milk secreted.

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*A summary of lectures delivered to the pastoralists in different centres along the Great Northern and Central Railway Lines.

## Considerations of Modern Research.

Modern research dealing with the mineral nutrition of farm animals has to consider—

1. Mineral requirement of the various species of farm animals.
2. The correct balance or proportion between the different constituents.
3. Relationship between the inorganic and organic portions of the ration.
4. Effect of outside factors, like sunlight and exercise on the mineral metabolism.
5. Study of diseases caused by faulty mineral nutrition.
6. Mineral constituents of various food stuffs.

1. Of the mineral elements required in the largest amounts for growth, &c., calcium or lime and phosphorus or phosphoric acid stands out on their own, and this is very clearly indicated by the large amounts of both found in the milk of the lactating animals. It will be noticed that the faster the growth of the young animal, the greater the amount of mineral matter required and supplied by its mother's milk.

| Species. | Time Required to Double Weight. | Composition of Milk. | | | | | |
|---|---|---|---|---|---|---|---|
| | | Protein. | Fat. | Sugar. | CaO. | $P_2O_5$. | Ash. |
| | Days. | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| Woman .. | 180 | 1·6 | 3·3 | 6·2 | 0·049 | 0·056 | 0·25 |
| Horse .. .. | 60 | 1·8 | 1·2 | 6·9 | 0·120 | 0·130 | 0·30 |
| Cow .. .. | 47 | 3·5 | 3·8 | 4·8 | 0·161 | 0·189 | 0·75 |
| Sheep .. .. | 15 | 6·7 | 8·6 | 4·3 | 0·250 | 0·290 | 0·97 |
| Pig .. .. | 10 | 7·2 | 4·6 | 3·1 | 0·395 | 0·357 | 1·05 |
| Rabbit .. .. | 6 | 15·5 | 10·5 | 2·0 | 0·89 | 0·99 | 2·56 |

For every 100 lb. of live weight a sheep or a pig requires about 1 lb. of lime and nearly 1 lb. of phosphoric acid, a calf requires about double these amounts and rather more phosphoric acid than lime. As a rule only about one-half of the lime and phosphoric acid supplied in the food can be assimilated and retained, and therefore the actual amount of food consumed should contain at least double the quantities absolutely necessary.

2. The balance or proportion between the different mineral constituents is now recognised to be of importance, and any serious alteration in the balance between two or more elements may affect assimilation, not only of these elements, but also of other constituents of the ration.

3. The relationship between inorganic and organic constituents of rations is shown by the fact that a ration which contains ample amounts of protein fat and carbohydrates may fail to produce normal growth if it is deficient in one or more of the mineral constituents. Addition of such will at once give increased growth and a much better utilisation of the food stuff.

4. Experiments have shown that sunlight and even artificial irradiation, lead to an improved lime and phosphorus assimilation, and may even make up for the want of vitamine D.

5. Diseases due to deficiencies of mineral matters have been reported from all parts of the world, and a concentrated attack to deal with such diseases is being made the last few years throughout the Empire.

## Investigations on Phosphorus Deficiency.

Sir Arnold Theiler, with a large staff of workers, made a very complete investigation on phosphorus deficiency as the cause of several diseases in South Africa, which were completely checked by giving the cattle liberal doses of bonemeal.

A full copy of his report appeared three years ago in the "Queensland Agricultural Journal" for March, 1925, and was reprinted in the Journal for September, 1928. Unfortunately, not much notice of the importance of his discovery was taken by readers at the time, and only his personal visit to the Commonwealth gave a fresh stimulus to this matter, more particularly as both he and Dr. J. B. Orr, Director of the Rowett Research Institute, Aberdeen, another oversea visitor to our States, clearly recognised similar wants in our

pasture as well as clear signs of malnutrition. The principal sickness due to phosphorus deficiency in South Africa, is the Styfsiekte or stiffsickness, with its most obvious outward sign of bone chewing, or osteophagia. This is a specific form of depraved appetite, showing by cattle having a predilection for bones, chiefly bleached bones. In more aggravated cases even putrifying bones and rotten carcasses are eaten. The animals are easily tested in practice if they are marked cravers, slight cravers, or non-cravers, which is very useful for experimental purposes. The osteophagia is a precursor of serious diseases, stunted growth, poor condition, and heavy mortality. Feeding the animals with 3 oz. of bonemeal per head per day absolutely controls the disease, and enormously improves the condition of the cattle.

A few diagrams shown in Sir Arnold Theiler's report, which was republished in full in September (1928) number of the Journal, clearly demonstrate the improvement in growth, increase of food consumed, &c. Particularly interesting is the quick change which takes place when batches of the experimental animals have their treatment reversed, the controls receiving bonemeal, and the bonemeal withdrawn from others. The change in the animals manifests itself in a very short time, and the recovery of some is simply marvellous.

Seasonal changes should also be noted, and the quick improvement in cattle following spring rains.

The phosphorus was supplied in various forms, but the results obtained were the same. Addition of lime did not prevent osteophagia, but rather increased the evil. Bonemeal as the best and cheapest form of phosphatic available in South Africa was chosen for general use. Mineral phosphates were tried, but were found too costly and rather difficult of digestion; superphosphate was found to cause digestive troubles. Precipitated calcium phosphate behaved very much like bone phosphate.

We are very fortunate in Queensland that we have in finely-crushed Nauru and Ocean Island phosphate, a comparatively cheap natural, pure, tricalcic phosphate which can be safely and successfully used in place of bonemeal.

Unfortunately, manufacturers of proprietary licks, a great number of which were sold at exorbitant prices, although consisting chiefly of common salt, spread pernicious and what proved to be absolutely unfounded reports on the ill effects alleged to follow the use of finely-ground Nauru phosphate, which I generally recommend as the chief ingredient of a lick, stating that this phosphate causes ulceration of the bowels, causes the teeth to become loose, detrimentally affects the quality of the wool clip, and is actually harmful on account of the small amount of calcium fluoride found in Nauru phosphate. The authors of these statements overlooked the fact that even in bones as much as 2 per cent. of calcium fluoride exists, and they quoted absurd experiments in which doses of the highly soluble sodium fluoride were given to rats with their food, producing ill effects. It is well known that sodium fluoride is a powerful insecticide and germicide, and therefore poisonous, but the practically insoluble calcium fluoride is quite harmless. As a matter of fact, on one station where the manager was ordered by his directors, scared by these reports, to substitute bonemeal for the Nauru phosphate, which had been successfully used hitherto, it was found that the sheep refused to take the bonemeal-salt lick, and they had to return to the Nauru phosphate-salt lick. On another large station where Nauru phosphate-salt lick was used for over three years with the most beneficial results, increasing the flocks by over 50 per cent. and improving the percentage of lambing and the health of sheep which all had excellent teeth, the last wool clip was of particularly high quality, obtaining top prices in the market. Experiments made in America twenty years ago supplying pigs with various forms of phosphate proved clearly that the form in which phosphorus was supplied in the food was practically immaterial and all gave equally good results.*

There is practically no difference in the solubility in weak acids of finely-crushed Nauru phosphate and bonemeal, but the latter should always be specially sterilised when used as lick. Bone char, bone ash could also be used, but the use of superphosphate must be generally condemned, and Sir Arnold Theiler distinctly states that superphosphate used as lick produces digestive disturbances.

Application of phosphatic fertilisers to pasture, in South Africa using 500 lb. superphosphate per acre, produced the same results as bonemeal feeding, but, of course, this is of not much practical value to our pastoralists, as phosphatic manuring on a large scale would not be an economical proposition.

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*Research Bulletin, No. 1 of the Agricultural Research Station of the University of Wisconsin, U.S.A., June, 1909.

The want of phosphorus was traced by Sir Arnold Theiler and his co-workers to the pastures and to the soil itself, and in all the affected areas, the soil showed a great lack in available phosphoric acid, being generally less than .001 per cent.

There can be no doubt that our stock suffer to some extent, more so in certain districts, from a phosphorus deficiency, which becomes more evident and pronounced in drought periods. A supply of phosphorus just or barely sufficient for maintenance is quite inadequate for reproduction and growth. Sir Arnold Theiler's results showed that a breeding cow requires in the earliest stage of pregnancy only about 2 oz. of bonemeal per head per week more than an ox, whereas in an advanced stag of pregnancy as much as 28 oz. bonemeal per week were required to prevent osteophagia.

### Comparison of Composition of Pasture Grasses.

Of particular interest is the study of the following table giving the composition of pasture grasses as found in South Africa, in Queensland, &c., as compared with good European pasture.

| | Analysis of Water-free Material. | | | | |
|---|---|---|---|---|---|
| | Protein. | Fibre. | Ash. | CaO. | $P_2O_5$. |
| | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| Fattening Pasture, Romney Marsh, eaten .. | 22·9 | 20·2 | 8·7 | 0·99 | 1·01 |
| Fattening Pasture, Romney Marsh, non-eaten | 13·5 | 28·2 | 5·6 | 0·75 | 0·65 |
| Non-fattening Romney Marsh, eaten.. .. | 21·1 | 20·2 | 7·6 | 0·90 | 0·89 |
| Non-fattening Romney Marsh, non-eaten .. | 12·3 | 29·2 | 5·6 | 0·73 | 0·58 |
| Poor Average Pasture, England, eaten .. | 15·9 | 25·2 | 5·5 | 0·56 | 0·60 |
| Poor Average Pasture, England, non-eaten .. | 11·4 | 29·3 | 3·1 | 0·30 | 0·37 |
| Pasture, Falkland Island, eaten .. .. | 12·2 | .. | 4·6 | 0·29 | 0·54 |
| Pasture, Falkland Island, non-eaten .. .. | 7·0 | .. | 2·5 | 0·14 | 0·25 |
| Mixed Pasture, South Africa, November .. | 19·4 | 22·5 | 11·6 | 0·31 | 0·60 |
| Mixed Pasture, South Africa, January .. | 13·8 | 25·0 | 7·7 | 0·50 | 0·22 |
| Mixed Pasture, South Africa, March .. .. | 7·2 | 33·7 | 5·9 | 0·43 | 0·24 |
| Mixed Pasture, South Africa, May .. .. | 4·1 | 34·9 | 5·9 | 0·50 | 0·07 |
| Mitchell Grass, Queensland, green, 1926-27 .. | 7·9 | 31·7 | 10·9 | 0·62 | 0·38 |
| Mitchell Grass, Queensland, yellow, 1926-27.. | 6·0 | 28·9 | 10·7 | 0·44 | 0·20 |
| Mitchell Grass, Queensland, roughage, 1926-27 | 2·8 | 32·9 | 10·0 | 0·38 | 0·12 |
| Mitchell Grass, Queensland, young, 12in. long, 1929 | 18·8 | 27·6 | 12·6 | 1·09 | 0·51 |
| Mitchell Grass, Queensland, young, 18in. long, 1929 | 17·1 | 30·9 | 14·7 | 1·07 | 0·53 |
| Mixed Pasture, Queensland, average of 15 samples, 1914 | 6·3 | 41·2 | 11·9 | 0·49 | 0·45 |
| Roughage, Queensland, average of 40 samples, 1928 | 3·3 | 33·2 | 10·2 | 0·44 | 0·16 |
| Young Grasses, Queensland, average of 40 samples, 1929 | 10·0 | 32·7 | 11·3 | 0·69 | 0·46 |
| Paspalum, Queensland, unfertilised, 9 days old, 1927-28 | 8·2 | 25·4 | 12·7 | 0·72 | 0·55 |
| Paspalum, Queensland, unfertilised, 44 days old, 1927-28 | 6·8 | 29·8 | 11·9 | 1·15 | 0·37 |
| Paspalum, Queensland, fertilised, 9 days old, 1927-28 | 15·5 | 24·1 | 13·3 | 0·50 | 0·66 |
| Paspalum, Queensland, fertilised, 44 days old, 1927-28 | 7·4 | 35·9 | 10·2 | 0·63 | 0·40 |
| Rhodes Grass, Queensland, 6 weeks old .. | 13·7 | 33·9 | 9·4 | 0·49 | 0·39 |
| Rhodes Grass, Queensland, 3 months old .. | 7·1 | 34·8 | 9·7 | 0·41 | 0·23 |
| Kikuya Grass, Queensland, old .. .. | 5·2 | 26·9 | 12·3 | 0·75 | 0·55 |
| Kikuya Grass, Queensland, 4 weeks old .. | 15·8 | 25·5 | 8·9 | 0·59 | 0·71 |

The most striking feature is the high percentage of protein, lime, and phosphoric acid, calculated on the water free material, found in the pastures readily eaten by sheep on Romney Marsh, England. The pasture not eaten is still very much richer than the best of our own pastures. On Falkland Island, which is heavily stocked, a considerable falling off in the stamina of the sheep has been noted and is due to the fact that the pasture was never fertilised. The mineral constituents

lime and phosphoric acid are very low. The great falling off in nutritious quality of the South African pastures with age is clearly shown, more particularly the great reduction in the phosphoric acid contents of the ash, which is quite good in November, becomes already low in January and March, and falls away to practically nothing in May.

A similar condition exists in the Mitchell grass pasture and a distinct want of phosphoric acid in the older growth is to be noticed.

The great increase in the protein contents of paspalum pasture due to application of a complete fertiliser, with an extra supply of nitrogenous manure, is also worth noting.

### Lack of Protein.

It has been found that the supply of lick will lead to greater consumption of fodder, and greatly help in the digestion and assimilation of all nutrients, but after all it cannot create protein if it is not there, and the actual value of a feed must depend principally on the amount of protein it supplies. I have repeatedly expressed the opinion that our stock are suffering for long periods of their existence of a protein starvation, with or without lime and phosphorus deficiencies. Lime itself is but very rarely deficient, but phosphorus is, although not in such a pronounced degree as found by Sir Arnold Theiler in South Africa. Only in very isolated cases our soils contain less than 0.01 per cent. of available phosphoric acid, which means about 300 lb. per acre foot, whereas the soils in South Africa, showing disease, have only .001 per cent. or 30 lb. per acre foot. For years very full analyses of grasses, fodders, &c., have been carried out in our agricultural laboratory, and only in a very few cases such low amounts of phosphoric acid have been found in the samples as are recorded in South Africa.

### Sheep Affected by Malnutrition.

Sheep will be affected by malnutrition in a similar manner, although the outward symptoms are rarely so pronounced as with cattle. Bone chewing, and more frequently licking up of earth, are noticed; an excessive liking for salt is also an indication of depraved appetite. The fact of sheep licking certain soil does not indicate that such soil would make a good lick, as many a correspondent to this Department has asserted, but is simply a sign of depraved appetite due to malnutrition. The far-reaching results of malnutrition are shown by stunted growths, loss of fecundity, poor percentage of lambing, great mortality among young lambs, greater liability to suffer from worms, and attack by blow flies. Of course all these symptoms become more pronounced during periods of drought. A large number of pastoralists tried to save their sheep from starvation by giving them salt licks, and in many cases where the drinking water was also saline, actually killed the sheep through salt poisoning. The actual amount of salt required by sheep is extremely small, only about 4 to 5 lb. of salt are required per annum, and this quantity is generally fully supplied in the pasture grass, and drinking water. The other mineral constituents, lime and phosphoric acid necessary for the maintenance of an adult sheep, are generally supplied by good natural pasturage, but in the case of ewes the requirements increase rapidly during pregnancy and remains high during the lactating period, so that the amounts supplied by pasturage are in a great number of places not sufficient to cover the demand. The requirements of a young growing lamb are equally high, and from two to three times greater than those of an adult sheep.

The actual amounts of lime and phosphoric acid removed from the soil by wool and sheep are very small, amounting to a few ounces per acre annually; even with fairly heavy stocking of, say, one sheep to 2½ acres, the amount of lime phosphate removed would be approximately only 1 lb. per acre per annum; so that, with an average amount of one-hundredth of a per cent. of available phosphoric acid in a soil, the supply would last many hundred years. Unfortunately, the situation is not quite as favourable as it appears at first sight. Stock naturally prefer the best and most succulent fodders and remain in such localities, and as a consequence the best and most nutritious grasses are eaten out continually and are likely to disappear and be replaced by coarse, poor varieties. As previously pointed out, amounts of mineral constituents must be available in large excess, both for vegetable and animal growth.

### Analyses of Soil.

Mr. J. E. Thomas, when making his investigation on the feeding of sheep under drought condition, drew particular attention to the great difference between the pebbly and rolling downs in Central Queensland with regard to nutritive value and palatability of the grasses. The pebbly downs always show a much higher lambing

percentage, better growth and yield of wool. These facts were explained by analyses of the soils made in our laboratory. The physical condition of the pebbly downs soil was much better than that of the clayey downs, showing much better capillarity. Humus and nitrogen contents of both soils were rather low, lime plentiful both total and available amounts, the amount of available phosphoric .0195 per cent. in pebbly downs soil against .0014 per cent. in clayey down soil, which is dangerously low. The actual amount of feed grown in good seasons is much larger on the rolling downs soil, but the fodder is not so well relished as the sparser growth, but more varied and palatable feed of the pebbly downs.

The principal fodder grass in the western country is Mitchell grass, which is the most drought resistant of our grasses, but its nutritive value is generally very much overrated. The quality varies very much according to seasons, as shown by a great number of analyses, but is at its best in its young growth.

Flinders grass requires a better rainfall than Mitchell grass, but is a more nutritious and more palatable grass, even in the drying-off stage.

Blue grasses require a still heavier and more evenly distributed rainfall and are highly nutritious in their earliest stages of growth, but lose their nutrition value very quickly when drying off.

Edible herbs and shrubs are available in most districts, although restricted in the main areas of Central and Northern-West Queensland.

Looking over the list of analyses of such fodder plants published in the annual report, it will be noted many of them are of high food value. The prickly acacia bush and trefoil, Medick burr, stand out on their own on account of high protein contents, and are therefore greatly relished by stock.

### Food Supply in Time of Drought.

The greatest problem facing the stockowner is the feeding during drought periods. From the previous remarks it is quite evident that the roughage available in such periods is of exceedingly low feeding value, and therefore the problem resolves itself into supplies of proteins, minerals, and roughage itself.

Proteins can be supplied principally in forms of maize and other grains, and prepared concentrated fodders in the form of nuts or cubes, in which mixtures of all sorts of grains, by-products, and milling offals can be utilised with advantage.

Lucerne hay is of great value, being high in protein and minerals, and at the same time is a palatable roughage, but, unfortunately, high cost limits extensive use. The supply of roughage is the most serious problem in drought time, as it is quite impossible to maintain sheep on licks or grains alone.

What could be done with regard to conservation of fodder for roughage, bush hay, and perhaps in some cases fodder crops, chiefly sorghums, are problems of the future. In the meantime the liberal use of phosphatic licks will improve matters, and stock should be allowed to make the best use of poor coarse fodders, this being advantageous to the grazier in good and bad seasons.

### Licks Recommended.

The lick at present recommended, and already successfully used in several places, is made by mixing one part of coarse salt (free from large lumps) with two parts finely ground Nauru or Ocean Island phosphate.

Nauru phosphate is an excellent substitute for bonemeal, as it is cheaper and contains a much higher percentage of lime and phosphoric acid than bonemeal.

The use of phosphatic licks is of particular importance when feeding on scrub, as practically all our western scrub trees contain in the ash of their leaves a very large amount of lime and very little phosphoric acid. Any large excess of lime accentuates the want and deficiency of phosphorus.

When feeding very dry, coarse roughage, the addition of small amounts of Epsom salts, about 10 lb. to every 100 lb. of lick, is advisable. In very rare cases the addition of about 3 to 5 per cent. of flowers of sulphur, and/or 2 to 3 per cent. of iron sulphate (green vitriol) may have a beneficial effect.

### Quantity of Licks to be Supplied.

It is of importance that the stockowner has a rough idea how much lick the animals actually consume; a lamb or a wether should get about 2 oz. of phosphate, or 3 oz. of the mixed lick per week; a ewe with lamb can get up to 6 oz. of phosphate per week. As the Nauru phosphate has neither taste nor odour, the animals in some cases do not take readily to the lick, and in such cases sprinkling the lick with a

little molasses, or adding about 5 to 10 per cent. of linseed meal, or any other meal to the lick will induce the animals to eat the lick more readily. The addition of these materials is discontinued or reduced when a sufficient amount of lick is consumed. An extra amount of phosphate will not hurt the sheep, but an increased amount of salt may do serious harm. Keep a supply of lick going the whole year round, so that the animals can get it any time they want it.

If the drinking water is distinctly saline, the use of salt in the lick should be omitted altogether, and a small amount of meal or molasses used in its place.

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Plate 224.—Mr. James A. Heading, D.C.M., M.M., of Cloyna, Murgon.

At a meeting of the Board of Directors of the Queensland Co-operative Bacon Association, Limited, Murarrie, Queensland, recently, Mr. Heading was re-elected Chairman of Directors. He is also a Director of the Farmers' Co-operative Distributing Association, Limited, and of the South Burnett Co-operative Dairy Company, Limited, besides being Chairman of the Murgon Shire Council and a member of the executive of the Local Producers' Association of Queensland.

A progressive and successful farmer, Mr. Heading is a keen advocate of co-operation, and is one of our best known leaders in agricultural organisation. He is also associated with the Australian Pig Industry Council and is a member of the Queensland Pig Industry Committee.

# RATIONS FOR DAIRY COWS.

E. H. GURNEY, Senior Analyst.

Feeders of dairy stock frequently forward to the Department lists of feed materials available to them, desiring to know how to make balanced rations from such material. On account of this it was thought that examples of rations made up with various feeds might prove useful, some of the examples being composed of feedstuffs named in the lists mentioned above.

The Agricultural Chemist, Mr. J. C. Brünnich, has written a pamphlet entitled "Stock Foods," in which the objects of feeding, description and analyses of various stock foods, and the making up of rations are all very fully detailed, and with this information the dairy farmer can judge how to feed to the best advantage.

Modern experience has shown that rations with somewhat lower protein content than was previously considered necessary can be successfully used.

Examples of rations computed from analyses of feedstuffs contained in "Stock Foods" are given below, and are in accordance with the feeding standards for dairy cows published in "Feeds and Feeding Abridged," by Henry and Morrison.

Professor J. K. Murray states that this standard is referred to in lectures in the Agricultural Course at the Queensland University.

HENRY AND MORRISON FEEDING STANDARD.

| — | Digestible Crude Protein. | Total Digestible Nutrients. |
|---|---|---|
| *Dairy Cows.* | | |
| For maintenance of a 1,000-lb. cow .. .. | 0·700 | 7·925 |
| To allowance for maintenance add— | | |
| For each 1 lb. of 2·5 per cent. milk .. | 0·045—0·053 | 0·230—0·256 |
| For each 1 lb. of 3·0 per cent. milk .. | 0·047—0·057 | 0·257—0·286 |
| For each 1 lb. of 3·5 per cent. milk .. | 0·049—0·061 | 0·284—0·316 |
| For each 1 lb. of 4·0 per cent. milk .. | 0·054—0·065 | 0·311—0·346 |
| For each 1 lb. of 4·5 per cent. milk .. | 0·057—0·069 | 0·338—0·376 |
| For each 1 lb. of 5·0 per cent. milk .. | 0·060—0·073 | 0·362—0·402 |
| For each 1 lb. of 5·5 per cent. milk .. | 0·064—0·077 | 0·385—0·428 |
| For each 1 lb. of 6·0 per cent. milk .. | 0·067—0·081 | 0·409—0·454 |
| For each 1 lb. of 6·5 per cent. milk .. | 0·072—0·085 | 0·434—0·482 |
| For each 1 lb. of 7.0 per cent. milk .. | 0·074—0·089 | 0·454—0·505 |

Then upon this standard, a 1,000-lb. cow, yielding 25 lb. of milk of 3.5 per cent. fat, would require from a minimum amount of digestible crude protein $0.049 \times 25 = 1.225 + 0.7 = 1.925$ lb. to a maximum amount $0.061 \times 25 = 1.527 + 0.7 = 2.225$ lb.; and this cow would require from a minimum amount of total digestible nutrients $0.284 \times 25 = 7.1 + 7.925 = 15.025$ lb. to a maximum amount $0.316 \times 25 = 7.900 + 7.925 = 15.825$ lb.

Again, a 1,000-lb. cow, yielding 25 lb. of milk of 4.0 per cent. fat, would require from 2.05 lb. to 2.325 lb. digestible crude protein, and from 15.7 lb. to 17.57 lb. total digestible nutrients.

The term "nutritive ratio" means that amount of digestible protein that exists in a feed compared with the amount of non-nitrogenous digestible nutrients in that feed. As fat is capable of producing more heat when digested than the other nutrients, the fat content in the following rations has been multiplied by 2.3, and the product added to the amount of digestible carbohydrate and fibre—this total divided by the digestible protein gives the "nutritive ratio" of the ration. Thus in No. 1 ration, there is one part of digestible protein to six parts of other digestible nutrients.

When considering rations for animals it must be understood that other factors, beside the digestible crude protein and total digestive nutrients supplied to the animal, must be taken into account, such as succulence, palatability, and variety of feeds.

Proteins are very complex bodies, and different proteins yield different substances when digested, and a number of these different substances have to be supplied by the food for satisfactory nutrition. Therefore there is less chance of feeding an unbalanced protein content by using several feedstuffs, than by using only one or two.

Rations are useful guides in feeding, but it must be noted that the analyses of the feedstuffs from which they are computed are averages only—that is to say, the composition of the feedstuffs varies according to soil and climate wherein grown, and particularly to the age of growth when harvested.

The legumes, such as lucerne, cowpea, clover, &c., are characterised by the high amount of phosphorus and lime (particularly lime) they contain. Therefore, when animals graze on grass pastures growing upon soils deficient in phosphoric acid and lime, the inclusion of a legume in a ration is of particular value to these animals supplying both protein and mineral matter. Bran is also relatively rich in phosphorus.

There is in very many cases a deficiency of phosphoric acid in the pasture grazed by dairy stock. Where such deficiency occurs the rations should be supplemented by the addition of from 2 to 4 oz. of a mixture of finely ground Nauru phosphate and salt. The mixture is in the proportion of two parts by weight of finely ground Nauru phosphate to one part by weight of salt.

Another consideration is the cost of a particular ration—whether it pays, when it is compared with the price obtained from the milk produced. But care should be taken that blame for unprofitable feeding is not placed upon the ration, when the fault is due to the cow. Some cows are capable of producing a large amount of milk, other cows are only capable of yielding a small amount of milk, even when supplied with ample well-balanced feed; such poor producers do not pay, and should be culled out from the herd.

Rations per 1,000-lb. Cow Yielding 25 lb. Milk.

| | Dry Matter. | Digestible Nutrients. | | | | Total Digestible Nutrients. | Nutritive Ratio. |
|---|---|---|---|---|---|---|---|
| | | Crude Protein. | Fat. | Carbo-hydrates. | Fibre. | | |
| | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | |
| 1.— | | | | | | | |
| 40 lb. Green Sorghum .. | 8·0 | 0·48 | 0·08 | 2·32 | 1·36 | | |
| 60 lb. Mixed Pasture (average) | 12·0 | 0·53 | 0·12 | 3·48 | 3·01 | | |
| 8 lb. Lucerne Chaff .. | 7·4 | 1·24 | 0·05 | 2·22 | 0·67 | | |
| | 27·4 | 2·25 | 0·25 | 8·02 | 5·04 | 15·5 | 1 ÷ 6·0 |
| 2— | | | | | | | |
| 65 lb. Green Sorghum .. | 13·0 | 0·78 | 0·13 | 3·76 | 2·14 | | |
| 7 lb. Lucerne Chaff .. | 6·4 | 1·08 | 0·04 | 1·95 | 0·58 | | |
| 7 lb. Maize Meal .. .. | 6·0 | 0·35 | 0·21 | 4·20 | 0·07 | | |
| | 25·4 | 2·21 | 0·38 | 9·91 | 2·79 | 15·3 | 1 ÷ 6·1 |
| 3— | | | | | | | |
| 45 lb. Green Sorgum .. | 9·0 | 0·54 | 0·09 | 2·61 | 1·49 | | |
| 13 lb. Wheat Chaff .. | 11·3 | 0·27 | 0·12 | 3·39 | 2·04 | | |
| 3 lb. Bran .. .. | 2·6 | 0·37 | 0·05 | 1·21 | 0·10 | | |
| 2¾ lb. Cotton Seed Meal (decorticated) | 2·5 | 0·96 | 0·17 | 0·54 | 0·06 | | |
| 2 lb. Molasses .. | 1·5 | 0·02 | .. | 1·15 | .. | | |
| | 27·9 | 2·16 | 0·43 | 8·90 | 3·69 | 15·2 | 1 ÷ 6·2 |

## RATIONS FOR DAIRY COWS—*continued.*

### Rations per 1,000-lb. Cow Yielding 25 lb. Milk—*continued.*

| | Dry Matter. | Digestible Nutrients. | | | | Total Digestible Nutrients. | Nutritive Ratio. |
|---|---|---|---|---|---|---|---|
| | | Crude Protein. | Fat. | Carbo-hydrates. | Fibre. | | |
| | Lb. | Lb. | Lb. | Lb. | Lb. | | |
| 4— | | | | | | | |
| 50 lb. Green Sorghum .. | 10·0 | 0·60 | 0·10 | 2·90 | 1·70 | | |
| 40 lb. Green Cowpea .. | 8·8 | 0·64 | 0·12 | 2·92 | 1·14 | | |
| 3 lb. Bran .. .. | 2·6 | 0·37 | 0·05 | 1·21 | 0·10 | | |
| 1¾ lb. Cotton Seed Meal (decorticated) | 1·6 | 0·61 | 0·11 | 0·34 | 0·03 | | |
| 4 lb. Molasses .. .. | 3·0 | 0·04 | .. | 2·29 | .. | | |
| | 26·0 | 2·26 | 0·38 | 9·66 | 2·97 | 15·3 | 1 ÷ 5·5 |
| 5— | | | | | | | |
| 42 lb. Sorghum Silage .. | 10·7 | 0·38 | 0·08 | 3·06 | 2·06 | | |
| 9 lb. Lucerne Chaff .. | 8·3 | 1·39 | 0·06 | 2·49 | 0·75 | | |
| 7 lb. Maize Meal .. .. | 6·0 | 0·35 | 0·21 | 4·20 | 0·07 | | |
| | 25·0 | 2·12 | 0·35 | 9·75 | 2·88 | 15·1 | 1 ÷ 6·3 |
| 6— | | | | | | | |
| 35 lb. Sorghum Silage .. | 8·9 | 0·31 | 0·07 | 2·55 | 1·71 | | |
| 5 lb. Lucerne Chaff .. | 4·6 | 0·77 | 0·03 | 1·38 | 0·42 | | |
| 6 lb. Wheat Chaff .. | 5·3 | 0·12 | 0·05 | 1·56 | 0·96 | | |
| 2 lb. Linseed Oil Meal .. | 1·8 | 0·44 | 0·15 | 0·63 | 0·09 | | |
| 3 lb. Pollard .. .. | 2·7 | 0·41 | 0·09 | 1·62 | 0·06 | | |
| 3 lb. Rice Meal .. .. | 2·7 | 0·20 | 0·28 | 1·50 | 0·06 | | |
| | 26·0 | 2·25 | 0·67 | 9·24 | 3·30 | 15·5 | 1 ÷ 6·2 |
| 7— | | | | | | | |
| 65 lb. Green Maize .. | 11·7 | 0·65 | 0·19 | 3·90 | 2·01 | | |
| 8 lb. Lucerne Chaff .. | 7·4 | 1·24 | 0·05 | 2·22 | 0·67 | | |
| 7 lb. Maize Meal .. | 6·0 | 0·35 | 0·21 | 4·20 | 0·07 | | |
| | 25·1 | 2·24 | 0·45 | 10·32 | 2·75 | 15·7 | 1 ÷ 6·3 |
| 8— | | | | | | | |
| 54 lb. Green Maize .. .. | 9·7 | 0·54 | 0·16 | 3·24 | 1·67 | | |
| 10 lb. Wheat Chaff .. .. | 8·7 | 0·21 | 0·09 | 2·61 | 1·57 | | |
| 3 lb. Maize Meal .. .. | 2·6 | 0·15 | 0·09 | 1·80 | 0·03 | | |
| 3 lb. Bran .. .. | 2·6 | 0·37 | 0·05 | 1·21 | 0·10 | | |
| 2¾ lb. Cotton Seed Meal (decorticated) | 2·5 | 0·96 | 0·17 | 0·54 | 0·06 | | |
| | 26·1 | 2·23 | 0·56 | 9·40 | 3·43 | 5·6 | 1 ÷ 6·3 |
| 9— | | | | | | | |
| 30 lb. Maize Silage .. .. | 9·0 | 0·30 | 0·09 | 3·21 | 1·56 | | |
| 5 lb. Good Bush Hay .. | 4·6 | 0·14 | 0·03 | 1·20 | 1·13 | | |
| 4 lb. Cowpea Chaff .. | 3·6 | 0·45 | 0·07 | 0·76 | 0·54 | | |
| 5 lb. Maize Meal .. .. | 4·4 | 0·25 | 0·15 | 3·00 | 0·05 | | |
| 3 lb. Cocoanut Cake .. | 2·6 | 0·40 | 0·21 | 1·19 | 0·20 | | |
| 1 lb. Blood Meal .. .. | 0·9 | 0·67 | 0·01 | 0·05 | .. | | |
| | 25.1 | 2·21 | 0·56 | 9·41 | 3·48 | 15·6 | 1 ÷ 6·4 |

## RATIONS FOR DAIRY COWS—*continued.*

RATIONS PER 1,000-LB. COW YIELDING 25 LB. MILK—*continued.*

| — | Dry Matter. | Digestible Nutrients. | | | | Total Digestible Nutrients. | Nutritive Ratio. |
|---|---|---|---|---|---|---|---|
| | | Crude Protein. | Fat. | Carbohydrates. | Fibre. | | |
| | Lb. | Lb. | Lb. | L.B. | Lb. | Lb. | |
| 10— | | | | | | | |
| 35 lb. Maize Silage .. | 10·5 | 0·35 | 0·10 | 3·75 | 1·82 | | |
| 8 lb. Lucerne Chaff .. | 7·4 | 1·24 | 0·05 | 2·22 | 0·67 | | |
| 7 lb. Barley Meal .. .. | 6·2 | 0·65 | 0·06 | 4·27 | 0·21 | | |
| | 24·1 | 2·24 | 0·21 | 10·24 | 2·70 | 15·4 | 1 ÷ 6·0 |
| 11— | | | | | | | |
| 80 lb. Green Paspalum .. | 20·0 | 1·20 | 0·16 | 5·60 | 4·96 | | |
| 6 lb. Lucerne Chaff .. | 5·5 | 0·93 | 0·04 | 1·67 | 0·50 | | |
| | 25·5 | 2·13 | 0·20 | 7·27 | 5·46 | 15·0 | 1 ÷ 1·6 |
| 12— | | | | | | | |
| 67 lb. Green Paspalum .. | 16·5 | 1·00 | 0·13 | 4·69 | 4·15 | | |
| 3 lb. Maize Meal .. .. | 2·6 | 0·15 | 0·09 | 1·80 | 0·03 | | |
| 3 lb. Bran .. .. .. | 2·6 | 0·37 | 0·05 | 1·21 | 0·10 | | |
| 2 lb. Cotton Seed Meal (decorticated) | 1·8 | 0·70 | 0·13 | 0·39 | 0·04 | | |
| | 23·5 | 2·22 | 0·40 | 8·09 | 4·32 | 15·0 | 1 ÷ 6·0 |
| 13— | | | | | | | |
| 100 lb. Sudan Grass .. .. | 22·0 | 1·50 | 0·10 | 7·50 | 3·80 | | |
| 4½ lb. Lucerne Chaff .. | 4·1 | 0·70 | 0·03 | 1·25 | 0·37 | | |
| | 26·1 | 2·20 | 0·13 | 8·75 | 4·17 | 15·3 | 1 ÷ 6·0 |
| 14— | | | | | | | |
| 100 lb. Sudan Grass .. | 22·0 | 1·50 | 0·10 | 7·50 | 3·80 | | |
| 3 lb. Bran .. .. | 2·6 | 0·37 | 0·05 | 1·21 | 0·10 | | |
| 1 lb. Cotton Seed Meal (decorticated) | 0·9 | 0·35 | 0·07 | 0·19 | 0·02 | | |
| | 25·5 | 2·22 | 0·22 | 8·90 | 3·92 | 15·3 | 1 ÷ 6·0 |
| 15— | | | | | | | |
| 50 lb. Sudan Grass .. .. | 11·0 | 0·75 | 0·05 | 3·75 | 1·90 | | |
| 8 lb. Wheat Chaff .. .. | 7·0 | 0·16 | 0·07 | 2·09 | 1·29 | | |
| 4 lb. Lucerne Chaff .. | 3·7 | 0·62 | 0·02 | 1·11 | 0·33 | | |
| 3 lb. Maize Meal .. .. | 2·6 | 0·15 | 0·09 | 1·80 | 0·03 | | |
| 2 lb. Linseed Oil Meal .. | 1·8 | 0·44 | 0·15 | 0·63 | 0·09 | | |
| | 26·1 | 2·12 | 0·38 | 9·38 | 3·64 | 15·5 | 1 ÷ 6·5 |
| 16— | | | | | | | |
| 20 lb. Green Oats .. .. | 4·6 | 0·28 | 0·08 | 1·30 | 0·98 | | |
| 8 lb. Lucerne Chaff .. | 7·4 | 1·24 | 0·05 | 2·22 | 0·67 | | |
| 10 lb. Wheat Chaff .. .. | 8·8 | 0·21 | 0·09 | 2·61 | 1·61 | | |
| 3 lb. Cocoanut Cake .. | 2·6 | 0·40 | 0·22 | 1·19 | 0·20 | | |
| 3 lb. Molasses .. .. | 2·3 | 0·03 | .. | 1·72 | .. | | |
| | 25·7 | ·162 | 0·45 | 9·04 | 3·46 | 15·1 | 1 ÷ 6·3 |

## RATIONS FOR DAIRY COWS—*continued.*

### Rations per 1,000-lb. Cow Yielding 25 lb. Milk—*continued.*

| | Dry Matter. | Digestible Nutrients. | | | | Total Digestible Nutrients. | Nutritive Ratio. |
|---|---|---|---|---|---|---|---|
| | | Crude Protein. | Fat. | Carbo-hydrates. | Fibre. | | |
| 17— | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | |
| 25 lb. Green Barley .. | 5·2 | 0·45 | 0·10 | 1·50 | 1·07 | | |
| 13 lb. Wheat Chaff .. .. | 11·4 | 0·27 | 0·11 | 3·40 | 2·10 | | |
| 6 lb. Lucerne Chaff .. | 5·5 | 0·93 | 0·04 | 1·67 | 0·50 | | |
| 2 lb. Linseed Oil Meal .. | 1·8 | 0·44 | 0·15 | 0·63 | 0·09 | | |
| 3 lb. Molasses .. .. | 2·3 | 0·03 | .. | 1·72 | .. | | |
| | 26·2 | 2·12 | 0·40 | 8·92 | 3·76 | 15·2 | 1 ÷ 6·4 |
| 18— | | | | | | | |
| 60 lb. Sugar-cane Tops .. | 16·8 | 1·02 | 0·18 | 5·64 | 3·90 | | |
| 10 lb. Cowpea Chaff .. | 9·2 | 1·12 | 0·19 | 1·90 | 1·35 | | |
| | 26·0 | 2·12 | 0·37 | 7·54 | 5·25 | 15·3 | 1 ÷ 6·4 |
| 19— | | | | | | | |
| 50 lb. Sugar-cane Tops .. | 14·0 | 0·85 | 0·15 | 4·70 | 3·25 | | |
| 30 lb. Green Cowpea .. | 6·6 | 0·48 | 0·09 | 2·19 | 0·84 | | |
| 5 lb. Lucerne Chaff .. | 4·6 | 0·77 | 0·04 | 1·38 | 0·42 | | |
| | 25·2 | 2·10 | 0·28 | 8·27 | 4·51 | 15·2 | 1 ÷ 6·3 |
| 20— | | | | | | | |
| 35 lb. Elephant Grass .. | 7·0 | 0·32 | 0·07 | 2·03 | 1·75 | | |
| 35 lb. Imphee .. .. | 7·0 | 0·42 | 0·07 | 2·03 | 1·15 | | |
| 8 lb. Lucerne Chaff .. | 7·4 | 1·24 | 0·05 | 2·22 | 0·67 | | |
| 5 lb. Maize Meal .. .. | 4·4 | 0·25 | 0·15 | 3·00 | 0·05 | | |
| | 25·8 | 2·23 | 0·34 | 9·28 | 3·62 | 15·5 | 1 ÷ 6·1 |
| 21— | | | | | | | |
| 35 lb. Elephant Grass .. | 7·0 | 0·32 | 0·07 | 2·03 | 1·75 | | |
| 35 lb. Imphee .. .. | 7·0 | 0·42 | 0·07 | 2·03 | 1·15 | | |
| 10 lb. Pumpkins .. .. | 1·7 | 0·15 | 0·06 | 0·80 | 0·16 | | |
| 7 lb. Lucerne Chaff .. | 6·4 | 1·08 | 0·04 | 1·95 | 0·58 | | |
| 5 lb. Maize Meal .. .. | 4·4 | 0·25 | 0·15 | 3·00 | 0·05 | | |
| | 26·5 | 2·22 | 0·39 | 9·81 | 3·69 | 16·1 | 1 ÷ 6·4 |
| 22— | | | | | | | |
| 65 lb. Mixed Pasture (average) | 13·0 | 0·57 | 0·13 | 3·77 | 3·26 | | |
| 9 lb. Lucerne Chaff .. | 8·3 | 1·39 | 0·05 | 2·50 | 0·75 | | |
| 5 lb. Maize Meal .. .. | 4·4 | 0·25 | 0·15 | 3·00 | 0·05 | | |
| | 25·7 | 2·21 | 0·33 | 9·27 | 4·06 | 15·8 | 1 ÷ 6·3 |
| 23— | | | | | | | |
| 15 lb. Poor Bush Hay .. | 14·0 | 0·21 | 0·08 | 2·77 | 3·03 | | |
| 10 lb. Pumpkins .. .. | 1·7 | 0·15 | 0·06 | 0·80 | 0·16 | | |
| 5 lb. Lucerne Chaff .. | 4·6 | 0·77 | 0·03 | 1·38 | 0·42 | | |
| 7 lb. Maize Meal .. .. | 6·1 | 0·35 | 0·21 | 4·20 | 0·07 | | |
| 1 lb. Blood Meal .. .. | 0·8 | 0·66 | 0·02 | 0·06 | .. | | |
| | 27·2 | 2·14 | 0·40 | 9·21 | 3·68 | 15·4 | 1 ÷ 6·4 |
| 24— | | | | | | | |
| 65 lb. Prairie Grass .. | 15·1 | 1·95 | 0·26 | 4·29 | 2·75 | | |
| 5 lb. Wheat Chaff .. .. | 4·4 | 0·10 | 0·04 | 1·30 | 0·80 | | |
| 5 lb. Maize Meal .. .. | 4·4 | 0·25 | 0·15 | 3·00 | 0·05 | | |
| 1 lb. Molasses .. .. | 0·7 | 0·01 | .. | 0·57 | .. | | |
| | 24·6 | 2·31 | 0·45 | 9·16 | 3·60 | 15·5 | 1 ÷ 5·9 |

It has been mentioned before that better results are obtained from rations composed of a variety of feed ingredients than from a ration made up with only one or two feedstuffs.

A very convenient method is to have on hand a quantity of the concentrates already mixed, and then to feed a certain quantity of this mixture with the roughage that is being used, increasing the quantity of the mixture used until it is noticed that no further increased milk production is obtained. An example of this procedure has been published in the "Live Stock Bulletin" under the heading of "4-2-1" plan; this meaning that a concentrate mixture is made of four parts maize meal, two parts ground oats, and one part linseed meal. The above mentioned paper recommends the following:—3 lb. of silage and 1 lb. of legume hay for every 100 lb. of the animal's body weight, and to gradually increase the amount given of the concentrate mixture until the cow is getting 1 lb. for every 5 lb. of milk produced. Thus a 1,000-lb. cow, yielding 25 lb. of milk, would be given a ration of 30 lb. maize silage, 10 lb. lucerne hay, and 5 lb. of the concentrate mixture—containing 2.26 lb. digestible crude protein and 13.6 lb. total digestible nutrients. This ration has the amount of digestible crude protein required by the Henry and Morrison standard, but has a somewhat lower amount of total digestible nutrients. Other concentrates can be used in this convenient manner.

For instance, a concentrate mixture could be prepared by mixing eight parts maize meal, one part bran, and one part cotton seed meal. This mixture would have the following composition:—

| | Dry Matter. | Digestible. | | | |
|---|---|---|---|---|---|
| | | Crude Protein. | Fat. | Carbo-hydrates. | Fibre. |
| | Lb. | Lb. | Lb. | Lb. | Lb. |
| 1 lb. Concentrate Mixture .. .. | 0·87 | 0·088 | 0·032 | 0·539 | 0·014 |
| 5 lb. Concentrate Mixture .. .. | 4·3 | 0·44 | 0·16 | 2·69 | 0·07 |

If 4 lb. maize silage and 1 lb. lucerne chaff be used for every 100 lb. live weight, and 1 lb. of the above concentrate mixture for every 5 lb. of milk produced, the following will be the ration for a 1,000-lb. cow yielding 25 lb. of milk:—

| | Dry Matter. | Digestible. | | | | Total Digestible Nutrients. | Nutritive Ratio. |
|---|---|---|---|---|---|---|---|
| | | Crude Protein. | Fat. | Carbo-hydrates. | Fibre. | | |
| | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | |
| 40 lb. Maize Silage .. .. | 12·0 | 0·40 | 0·12 | 4·27 | 2·08 | | |
| 10 lb. Lucerne Chaff .. .. | 9·2 | 1·55 | 0·07 | 2·77 | 0·84 | | |
| 5 lb. Concentrate Mixture .. | 4·3 | 0·44 | 0·16 | 2·69 | 0·07 | | |
| | 25·5 | 2·39 | 0·35 | 9·73 | 2·99 | 15·5 | 1 ÷ 5·6 |

The amount of digestible crude protein is a little higher in this ration than is required by the standard.

The following extracts from the "Agricultural Gazette" of New South Wales, December, 1927, are given as an illustration of what complete feeding, when combined with high milk-producing power, can accomplish:—

"On 15th October, 1927, Wagga Gladys, the seven-year old Jersey cow of the Hawkesbury Agricultural College herd, completed 365 days' official test for a yield of 20,835 lb. milk, with an average test of 5.52 per cent. and 1,149.385 lb. butter fat, which is equivalent to 1,384.8 lb. commercial butter. This is an official world's record for both milk and butter fat production for the Jersey breed. It was achieved on twice-a-day milking, whereas all the great records in other countries have been made on three and four milkings a day. Wagga Gladys calved on 9th November, 1926, and on the day of her last periodical test she yielded 53.5 lb. milk and 3.694 lb. butter fat in twenty-four hours."

The following is extracted from the "Agricultural Gazette" of New South Wales, October, 1927, and shows the ration fed to Wagga Gladys, together with the record of her 273 days' performance:—

"On her present lactations as a seven-year-old, which is still in progress, she has produced for the first nine-months' period 15,951 lb. milk, of 5.3 per cent. test, 839.814 lb. butter fat, being equal to 1,011.8 lb. commercial butter. . . . On the hypothesis that feeding must be linked with breeding to secure high production, an indication of the ration fed to Wagga Gladys may be given.

"*Concentrates.*—The following mixture was fed daily at the rate of 1 lb. to every 3½ lb. milk produced:—300 lb. maize meal, 200 lb. bran, 100 lb. crushed oats, 50 lb. linseed meal. During March and April the mixture was altered by the substitution of 25 lb. cotton seed meal for 25 lb. of the linseed meal.

"*Bulk Ration.*—The daily bulk ration consisted of:—25 lb. maize silage, 10 lb. lucerne chaff (of poor quality during May), 3 lb. bran, and 1½ lb. linseed meal. During March and April half the linseed meal was replaced by an equal amount of cotton seed meal. During the latter half of the month of March the silage was replaced by an equal amount of green corn stalks chaffed.

"*Grazing.*—The pastures were very poor, except after the Easter rain. In December, Wagga Gladys was grazed on a poor stand of green lucerne for two days prior to test. In January, she was grazed on green lucerne for two hours daily for a week previous to test. In February, March, and April, she was grazed on green lucerne for two hours daily, and in May and June for one hour daily. In July, green oats were given for a week previous to the test; Gladys and the whole herd went off in butter fat yield this month, and the green oats were blamed. In August, she was grazed on green lucerne for two hours daily."

It will be interesting to compare the above mentioned cow's milk production and her feeding, with the standard used in computing the examples of rations previously given. The weight of Wagga Gladys is not known, and though it may not be 1,000 lb. live weight, this figure will be used for the sake of comparison.

The cow produced 15,951 lb. milk in 273 days—that is, 58.4 lb. of milk per day, of 5.3 per cent. fat. Using the minimum requirements of the standard the cow should receive 4.32 lb. digestible crude protein and 29.7 lb. total digestible nutrients.

The cow produced on an average 58.4 lb. of milk per day, and it is stated that for every 3½ lb. of milk produced 1 lb. of the mixed concentrate was given, therefore, 16.6 lb. mixed concentrate was fed daily. The following is the total ration fed:—

| | Dry Matter. | Digestible Nutrients. | | | | Total Digestible Nutrients. | Nutritive Ratio. |
|---|---|---|---|---|---|---|---|
| | | Crude Protein. | Fat. | Carbo-hydrates. | Fibre. | | |
| Bulk Ration— | Lb. | Lb. | Lb. | Lb. | Lb. | Lb. | |
| 25 lb. Maize Ensilage .. | 7·5 | 0·25 | 0·07 | 2·67 | 1·30 | | |
| 10 lb. Lucerne Chaff .. | 9·2 | 1·55 | 0·07 | 2·77 | 0·84 | | |
| 3 lb. Bran .. .. | 2·6 | 0·37 | 0·05 | 1·21 | 0·10 | | |
| 1·5 lb. Linseed Meal .. | 1·3 | 0·33 | 0·11 | 0·47 | 0·06 | | |
| 16·6 lb. Mixed Concentrate | 14·6 | 1·50 | 0·52 | 8·20 | 0·37 | | |
| | 35·2 | 4·00 | 0·82 | 15·32 | 2·67 | 22·8 | 1 ÷ 4·9 |
| Allowing 10 lb. Green Lucerne for one hour's grazing .. | 2·4 | 0·32 | 0·04 | 0·63 | 0·29 | | |
| | 37·6 | 4·32 | 0·86 | 15·95 | 2·96 | 24·0 | 1 ÷ 4·8 |
| *Or* Allowing 20 lb. Green Lucerne for two hours' grazing .. | 4·8 | 0·64 | 0·08 | 1·26 | 0·58 | | |
| | 40·0 | 4·64 | 0·90 | 16·58 | 3·25 | 25·4 | 1 ÷ 4·7 |

It will be seen that the digestible crude protein, 4.32 lb., agrees with that required by the standard, and that the amount of total digestible nutrients of this ration is somewhat lower.

## MAMMITIS.

Under this heading may be included all derangements of the udder which are accompanied by inflammatory changes. Of all the domesticated animals the cow suffers most from this complaint, due to the extraordinary development of the mammary glands, as compared with those of the original type. Increased secretory power is accompanied by increased blood supply, and glandular tissue, but a decreased resistance to disease.

Mammitis may be divided into two broad classes—(1) Simple, (2) specific. In the first class would be included all those forms in which the primary cause is mechanical, such as injuries, cold, insect stings, overstocking, irregular or improper milking. In these cases the onset of the disease is ushered in with local inflammation in the area affected. This may be a portion or the whole of a quarter, or even one or more quarters may be involved. Should the affected area be extensive, there will also be constitutional changes, such as rise in temperature and loss of appetite. The local inflammation induces congestion with the accompanying symptoms of heat, pain, hardness, and cessation of normal milk secretion. The secretion from the congested area is watery and acid in reaction. This acid fluid, coming in contact with the normal milk in the teat duct, causes it to curdle, and the milk from that quarter will contain clots of curdled milk. Should proper attention be given to the case at this stage, the disease is arrested, and recovery quickly follows. First give a good active purgative, such as 12 to 16 oz. Epsom salts, mixed with a quart of warm water. To this mixture add a cup of treacle, and a dessertspoonful of ground ginger, and give as a drench. Local treatment consists of hot foments to the part, and frequent milking. Fomentations to be of value must be long continued—at least two hours once or twice daily.

If treatment has been omitted at this stage, pus-forming organisms invade the inflamed area, gaining an entrance through the milk ducts. The affected area is now an ideal breeding-place and they multiply very rapidly. Fluids drawn off at this stage will contain pus (matter) in addition to the curdled milk.

In the blood stream are certain cells called phagocytes whose function is to destroy invading bacteria. These phagocytes collect in and around the affected area. If they are not sufficiently numerous to destroy the bacteria, they cluster in the surrounding tissue and prevent the spread of the invading organisms. But during this time the toxins produced by the bacteria have caused a breaking down of the cellular tissue, which when mixed with the toxins has a debilitating action on the organisms which lowers their vitality. To further neutralise the action of the bacteria certain substances known as opsonius or antibodies appear in the blood stream and collect around the affected area and eventually destroy the invaders. The organisms having been destroyed, the temperature of the part is reduced, but the presence of the pus produced by their activity still remains and acts as a mild irritant. Should it be small in quantity it is absorbed into the system, but where the accumulation is considerable an abscess is formed.

Should the seat of the abscess be deeply surrounded by tissue, the fluid portions are absorbed and a fibrous capsule develops around the remainder. Should the abscess be near the surface, an external opening is formed and the contents evacuated and the broken down tissue is replaced by non-secreting tissue. Occasionally the abscess breaks into a milk duct and the pus can be drawn through the opening in the teat.

During what may be termed the secondary stage of the disease, that succeeding bacterial invasion—hot fomentation is of pronounced value, as it assists in reducing temperature by relaxing the tissues, and also induces a freer blood supply to the part. Should pain be severe, apply a mixture of equal parts of Belladonna liniment and soap liniment. Should the weight of the organ cause distress, support it by a broad bandage about 2 feet wide, in which four holes have been made for the teats. Place the teats in the holes, and pass the ends over the loins tying sufficiently tightly to support the weight of the udder.

In the second class called contagious mammitis in which the invasion of specific organisms is the primary factory, there are no constitutional symptoms, and very little local inflammation. The first indication of the presence of the disease is the decrease of normal milk in a quarter or quarters, and the presence of a brownish watery fluid. Rarely is there any curdling of the milk or pus in the milk. As the disease progresses, the quarter shrinks and becomes hard and fibrous and eventually dries up.

In this disease treatment consists of irrigation of the affected area with mild antiseptic solutions by gravitation. Take a small glass funnel, and about 7 feet of small rubber tubing. Fit one end of the tube to the funnel and to the other end attach a small milk tube. After careful sterilisation, insert the milk tube into the teat, using care not to injure the lining of the duct. Then holding the funnel about the level of the cow's back pour the fluid into it. In the funnel should be a loose pad and sterilised cotton wool to act as a strainer. After the quarter has been distended to its full capacity, remove the milk tube. Massage the quarter carefully and then draw the fluid off by ordinary milking. Repeat this treatment daily.

Care must be exercised in the selection of the disinfectant for injection as those which are acid in reaction, or have a tendency to coagulate albumen are unsuitable. Normal salt solution made by dissolving one teaspoonful of table salt to the pint of boiled water is of value or boracic acid 3 per cent. solution.

Treatment consists of introducing into the system of the patient a vaccine prepared from the various organisms which produce the disease. It is easily applied, acts quickly, is not expensive, and proves very satisfactory in cases of recent development. It is injected with an ordinary hypodermic syringe beneath the skin, usually behind the shoulder. It is supplied in small bottles containing 2 doses of 2 c.c. each, the second of which is injected about forty-eight hours after the first. In cases of recent origin two doses are usually sufficient to effect a cure. Treatment is obtainable through this Department, or direct from the Stock Experimental Station, Yeerongpilly.

In dealing with contagious mammitis, the infectious nature of the disease must be borne in mind. All affected animals should be removed from the herd, and, if possible, the person who treats them should not milk the healthy cows. As in small dairies this is not practicable, then these cows should be treated after milking is finished, and care should be taken to thoroughly cleanse the hands immediately after treatment. All fluids drawn from an affected cow should be collected in a vessel and then buried.

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## FOUNDING A DAIRY HERD.

When laying the foundation of a herd beginners with limited capital should buy females regardless of pedigree. Their selection should be made on the basis of type and production only, getting together animals which show prospect of really being seed stock. Often enough daughters of one sire can be secured, so that the operator's breeding programme can begin one generation ahead of the man who assembles on the basis of type and production alone. When finances are available and the animals can be found, we always recommend that they be line-bred and that all animals be members of the same family.

### A Line-bred Sire.

The beginner should start with a herd bull that is the result of the best efforts of our master breeders—a bull that has required many generations of matings to produce. Just how nearly he will be able to do this will depend on his dairy cow sense and his pocket-book. The first sire should be line-bred. When an outcross sire is used and he makes an improvement in the herd it is usually due to the fact that one side of his pedigree contains much of the blood of one or two highly improved animals. In other words, this is undoubtedly the fact that makes him prepotent.

The easiest if not the best way for the breeder with a small heard to line breed is to select a sire from a herd that carries the blood on which he wishes to base his breeding operations.. The second sire should be out of a paternal sister. Official testing should be a regular part of the work in the herd from which the herd sire is secured, because records constitute a principal basis of selection. The dam of the bull selected should be better than the best cow in the herd where he is to be used, better in both type and production. With the beginner this usually is not hard to do.

The operator should periodically visit the herd where he bought the first sire, and each time make a careful study of the bull's paternal sisters and of the families in the herd, considered from the female side. An option should be secured on males out of two or three such paternal sisters. The offspring of the second sire in this

case when bred on daughter of the first sire will have the sire of the first bull as their great grandsire on the top and also on the bottom of the pedigree.

If the man from whom the bulls were purchased was a constructive breeder there will be at least one other outstanding animal figuring on both sides of the pedigree. For example, the dam of the first bull may be a full or a half sister to the dam of the second bull—a fine condition to obtain, provided the animals are exceptionally good. When the second herd sire is secured, it is too soon to tell what the characteristic defect or defects of the daughters of the first sire are going to be. Such defects or lack of ability to "come through" must be expected. We have never seen the get of a bull which did not have them. The third bull should come from the same family, but have as his immediate ancestors animals in which there is not in evidence the outstanding defects of the females to which he is to be bred.

Selection must always play a leading role. An animal may have an ideal pedigree, but if he is lacking in type or his dam has an ill-shaped udder, or she has badly winged shoulders or the like, the pedigree must be ignored. There must be a balance, and all things considered, the sire with the line-bred pedigree has the best chance of coming through.

### The Sire.

The herd sire is half the herd. The dam of the herd sire is half of him, so the chances are that he will transmit as much from her as he does from his sire. No one man can do it all. He must depend on the breeder from whom he buys to have given similar considerations when he purchased or bred his sires. That is why we said that there is no other sensible conclusion than that we avail ourselves of the best of the best breeder's art. You, however, must be the man who decides which cow will be the dam of your herd sire. She should at least be a cow that even the most casual observer would turn to take a second look at.—"The Guernsey Breeders' Journal."

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## HOW OLD IS THE COW?

When a cow is over five years old her age can only be roughly guessed from the condition of the teeth (incisors) and the rings on the horns. But in the case of polled and dishorned stock there is only the teeth and the general appearance of the animals to indicate the age. A horned cow will be found to have a ring on her horns representing the birth of a calf yearly, and two years must generally be added to the number of rings because heifers are generally from two to two and a-half or three years old at the birth of their first calf. Thus a cow with four rings on her horns may be reckoned as six or seven years old.

But the condition of the teeth in reality determines the potential life service of the cow. The cow's molars may or may not be quite serviceable, but if her incisors are worn short, or broken, she may be accepted as ageing. Some cows have really good teeth at ten and twelve years old, but usually the teeth begin to shows signs of wear at six or seven years old. It depends a great deal upon the character of the soil, the crops, and the general feeding of the cows. On short, closely-gnawed pastures, especially on stony ground, the teeth of grazing cows wear fast. Fed on whole turnips, in a stone or concrete trough, having a rough, uneven bottom, the cow's teeth wear down faster than when she is fed on sliced turnips. The feeding of treacle and soft mashes hastens the decay of the teeth. The quality of the drinking water also affects the wearing qualities of the teeth.

Only the best milkers are, of course, retained till their teeth wear short. Occasionally a superior milch cow will be found with but a few rusty stumps where white ivories once were. Many an aged cow is reluctantly parted with, if she has been both superior at the pail and at the production of young stock. Many a good cow will well maintain her milk yield beyond twelve years old, but as a general rule cows are at their best after the birth of their third or fourth calf, say five or six years old, and when they arrive at the age of nine years their milk yield generally falls off gradually. Indifferent milkers are generally got rid of before they are five years old. Thus, if a buyer is in quest of a good cow at a market he is generally quite safe to buy a cow over six years, provided she is healthy, correct in the teats, and has fairly good teeth. But don't pay a stiff price for a cow that is past per prime.—The "Livestock Journal" (England).

# POULTRY FOR THE FRUITGROWER.

By P. RUMBALL, Poultry Expert.

THE combination of fruitgrowing and poultry-raising presents several features of economic importance. Fowls in the orchard obtain a good deal of natural food and help to maintain the orchard in good condition, thereby reducing the cost of production of both the fruit and the egg.

The advantages of the combination may be set down as follows:—

(1) Keeping down weeds.
(2) Keeping down many insect pests.
(3) The manurial value of poultry ranging in an orchard.
(4) Additional financial returns.

From the illustrations used in this the absence of weed growth will be noticed. This is not due to intense cultivation that is generally necessary, but to the presence of poultry. The owners of the farms where these photos. were taken assured the writer that before they kept fowls they were constantly cultivating and that now cultivation was only practised to loosen up the soil for the conservation of moisture. The keeping in check of weed growth means a good deal to the orchardist, while to the fowls it serves as an article of diet which is highly necessary for the maintenance of good health.

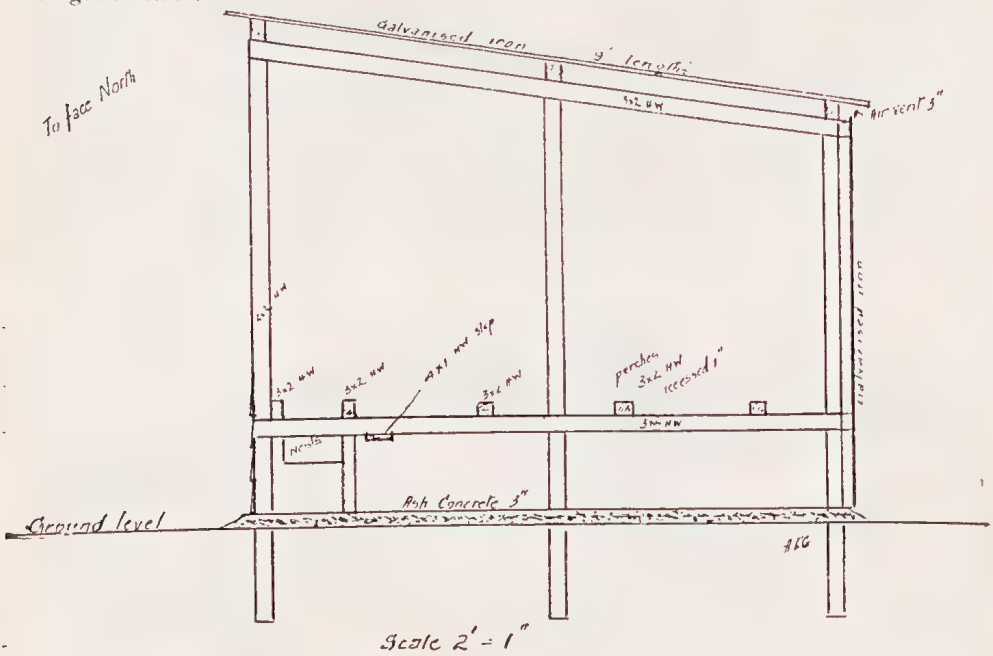


FIG. 1.

## nsect Pests.

The fruitgrower knows probably better than the writer, the large numbers of insect pests which are detrimental to his industry, and that many of them, such as pupæ of the fruit fly, &c., hibernate in the soil. These are not safe from poultry owing to their partiality to insect life and their foraging nature. Caterpillars, grasshoppers, crickets, and beetles of many descriptions, which cause damage to fruit trees, fall easy victims to poultry, while the fowls' habits of dust bathing themselves in the shade of the trees, tends to keep the soil loose and prevents the undue growth of surface roots.

## Manurial Value.

Possibly the greatest advantage in keeping fowls in conjunction with fruitgrowing is that of the manure distributed throughout the orchard. The grower knows what it costs to manure per acre or what it should cost, but he does not recognise the value of fowl manure. The quantity voided varies to some extent with different types of fowls and the method of feeding.

From a report published in the Journal of the Ministry of Agriculture of Great Britain of data collected at the College Poultry Farm, Theale, Reading, the following figures are taken:—

QUANTITIES VOIDED BY DIFFERENT BIRDS.

| Kind of Fowl. | Weight. | Manure Voided Weekly. | Percentage of Body Weight. | Manure Voided per Bird per Annum (Fresh). | Number of Birds to Void One Ton per Annum (Fresh). |
|---|---|---|---|---|---|
| | Lb. oz. | Lb. oz. | | Lb. | |
| Wyandotte cock .. | 6 12 | 1 13 | 26·8 | 94¼ | 24 |
| Faverolle hen .. | 5 12 | 1 11¼ | 29·6 | 88½ | 25 |
| Growing chicken, 14 weeks | 3 12 | 1 2½ | 30·8 | .. | .. |

The breeds principally used for egg production in Queensland are not shown, but it will be seen that the laying hen and the growing chicken void a greater percentage than an adult male bird, and with high-producing birds, such as the Leghorn and Orpington, a conservative estimate would be 30 per cent. of live weight; therefore, a 4-lb. Leghorn would void per annum 62¼ lb. and a 5-lb. Orpington 78, while it would take thirty-seven Leghorns or twenty-nine Orpingtons to void a ton.

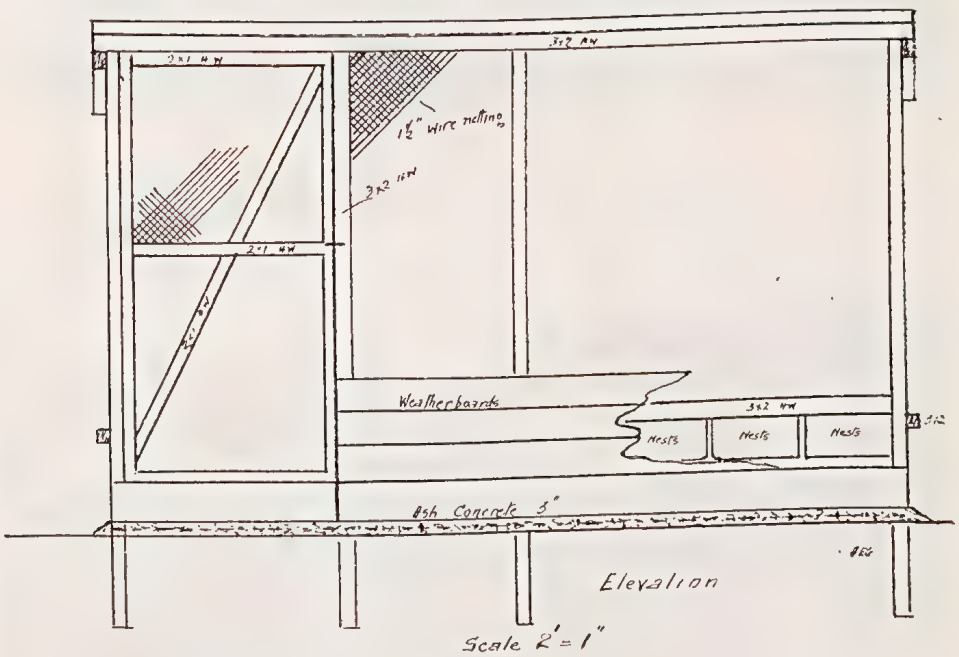


FIG. 2.

## Composition of Fresh Poultry Manure.

The analysis of poultry manure varies with feeding, but that from stock fed on lines usually adopted for the maximum production should comply very closely to the following:—

| Moisture. | Dry matter. | Nitrogen. | Phosphoric acid. | Potash. |
|---|---|---|---|---|
| 59.50 | 40.50 | 1.47 | .71 | .49 |

The commercial value of this manure based on its unit value is 39s. 6d. per ton, and the running of 200 fowls or slightly less, per acre, would be the means of manuring the land to the value of £10. However, its principal property being nitrogen some will be lost owing to its volatile nature, but there is in addition to the principal concentrates the organic matter—material which is an improvement to all soils.

Additional financial returns will depend largely upon the class of stock kept and the attention bestowed on them. Although they will save the grower many days labour in cultivation, spraying, &c., they will demand daily attention, and to the producer who is not inclined to give them this attention they are not recommended. Only the best should be kept. The breeding, rearing, and feeding should receive the same attention as the poultry farmer devotes to this work, as it is only by these means that the maximum results will be obtained. Generally speaking, each hen should return a profit over cost of feed, when kept in the vicinity of Brisbane, of about 10s., and 150 to 200 could be run per acre. This in conjunction with the manurial value should prove an incentive to fruitgrowers to work along these lines.

**Making a Start.**

Although the foregoing may appear attractive, in making a start, caution should be observed. The work of keeping poultry has to be fitted in and the great majority have to gain the experience essential for the rearing of young stock and the feeding of layers. A start should be made by the erection of a poultry house on the lines outlined in the plan, Figs. 1, 2, and 3. This house can be used with the addition of a cold brooder similar to that in Fig. 4 as a brooder house. After the brooding stage it can be used as a rearing house, and ultimately serve its original purpose of housing the adult laying stock. The rearing of chickens in quarters used for adult stock is not usually recommended, but under the conditions of range in the orchard soil contamination does not take place to any great extent.

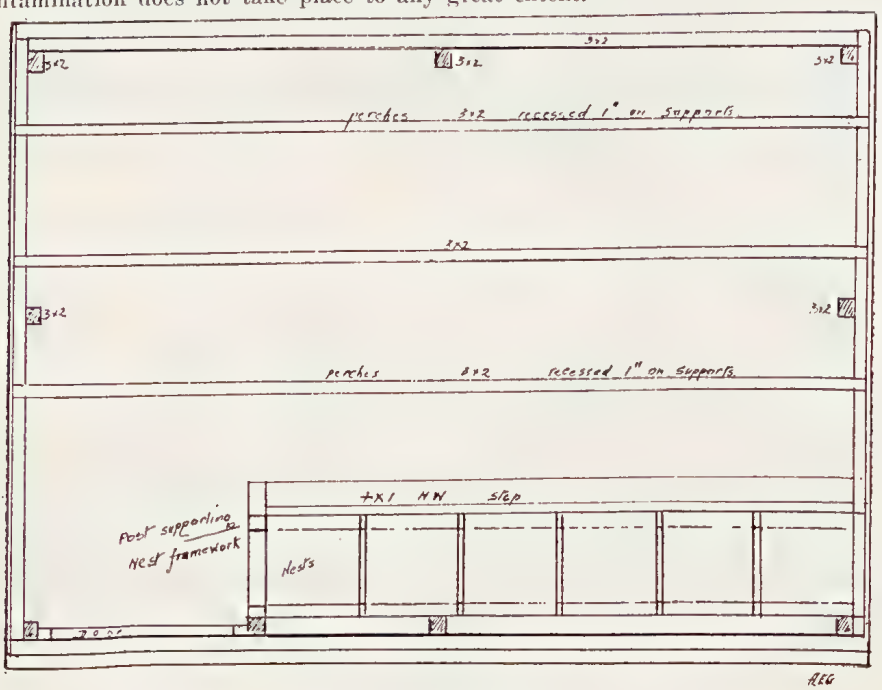


Fig. 3.

The purchase of day-old chickens should then be made from some reputable breeder and so save the necessity of buying breeding stock, and the work entailed in incubation. By doing this the number of chickens you have for a start are definite, they will be of the same age, which facilitates rearing and prevents the period of chicken rearing being unduly prolonged and becoming irksome. In making the purchase be sure and go to a reputable breeder who maintains the qualities, of both numbers and size of eggs in his stock.

Possible the best months for securing chickens is during August and September. Earlier chickens can be made use of if it is desired to have two lots during the one season, and so allow the first lot to get off your hands before a second lot is commenced with, say, in September.

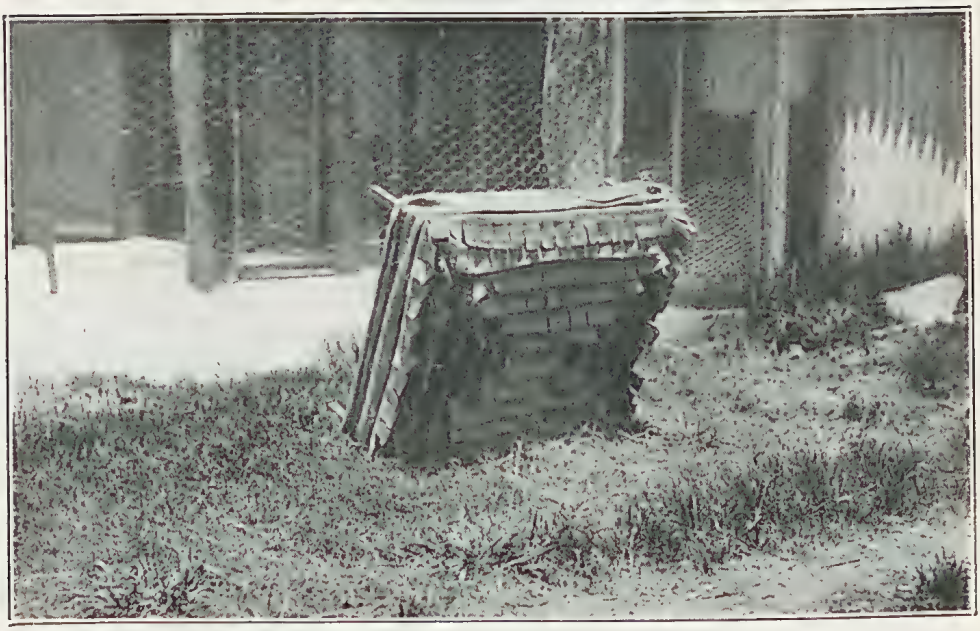

PLATE 225 (Fig. 4).—THE MULTIPLE BROODER.

PLATE 226 (Fig. 5).—PAPAWS AND POULTRY.

The luxuriant growth here seen is undoubtedly due to the value of the poultry manure. The soil is of a light loamy nature, and not naturally rich in plant food.

PLATE 227 (Fig. 6).—CUSTARD APPLES AND POULTRY.
This class of fruit tree offers a maximum amount of shade to poultry in summer.

PLATE 228 (Fig. 7).

Citrus fruit growing and poultry keeping is commonly practised in various localities. The benefits to this particular farmer of the combination have been less work and greater returns.

Netting partitions to keep various ages separate can be erected at convenient spaces if desired, but they would interfere with the cultivation of the orchard and are not absolutely essential. If chickens are reared in a special house and confined for the space of two or three weeks with a temporary fence they will invariably return to their own quarters to camp. Larger houses than shown in the plan may be built, but units of fifty placed at intervals about the orchard will ensure a better distribution of the birds' droppings and incidentally will cause the birds to forage over the whole of the orchard.

The system of feeding which is adopted may be either wet mash in the morning and grain at night or dry mash in hoppers which is before the birds all day and grain at night. The latter system especially to the novice and to the grower who desired to reduce his work is recommended. The birds by this means are assured of getting all the food they require for egg production, while the grower is relieved of a good deal of work daily.

Reference to the plan, Figs. 1, 2, and 3, plainly indicate the simple nature of the house suggested for the purpose of housing fifty laying hens. It is simple in structure, being open fronted, roofed, and walled at back and ends with corrugated iron. A 3-inch open space is provided between the top of the back wall and roof to permit of a good circulation of air. In front weather boards are used as a shield to the nests, the balance being netted in to allow of the stock being protected from predatory animals during the night. The nests are made from petrol tins, one side of which, with the exception of 1¼ inch, is removed. This is then turned at right angles to prevent the tin falling through the nest frame-work. Three perches are shown, 3 by 2 hardwood being used. This is placed on edge and the top corners slightly champered. They are supported on the bottom batten, and by being recessed in to the depth of 1 inch are perfectly firm, at the same time are easily removed for cleaning purposes.

The floor is raised to the extent of 3 inches above ground level to ensure dryness. Concrete is recommended, being readily cleaned and it does not become saturated with droppings. Earthen floors become foul and require renewal at frequent intervals.

The lines suggested on which a start should be made are economical as regards permanent fixtures and equipment, and also relieve the producer for the time being of establishing breeding pens, the necessity of purchasing incubators, and becoming acquainted with the operations of an incubator.

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## EFFECTS OF INTER-CULTIVATION.

During a farmer's whole lifetime he is constantly at war with weeds, and he cannot hope to receive the full reward of his labour if that warfare ceases, or is spasmodic. To completely eradicate weeds seems to be an impossibility, but at least they can be so held in check that they will not appreciably injure the growth of cultivated farm crops.

Weeds cause much injury in several directions. They rob the desired plants of much of their food supply, resulting in a reduction of their yield, and necessitating an increase of the quantity of fertilisers applied. It has been computed that some annual weeds take more potash and lime from the soil than two good wheat crops. Weeds rob the desired crop of a great deal of moisture, which they evaporate from their leaves; and this robbing the soil of moisture is one of the most serious effects that weeds have on cultivated plants. The secret of keeping weeds in check is to destroy them as soon as they appear, and keep on doing it. If they are allowed to develop seed, the evil is increased a thousand-fold.

Persistent inter-cultivation increases air supply in the soil, which results in a stimulation of the beneficial soil bacteria. Such cultivation also assists in destroying certain soil acids that are injurious to cultivated plants. It also increases the supply of nitrates in the soil. When the surface soil among growing crops is not stirred, the air in it becomes impure through the presence of too much carbonic acid; but cultivation has the effect of dispersing a great deal of the carbonic acid, its place being taken by oxygen, without which no farm plants can thrive. Cultivation—deep or shallow, as the circumstances demand—is the master key which enables the farmer to unlock Nature's stores of fertility and obtain the highest possible results from the fertilisers he may apply.

To quote an old writer on agriculture: "Men much wrong their corn in not giving their land sufficient workmanship; land in good tilth, in good heart, and sound, will cast out its very marrow."—Primrose McConnell in the "New Zealand Farmer."

# THE FARM TRACTOR.

By E. T. BROWN.*

The modern carburetter is constructed of such high-class material and is subjected to so little strain that it requires the minimum of attention to maintain it in perfect working order. The controls, however, should be looked to frequently, since owing to the amount of vibration when the outfit is working on the land, there is always a tendency for them to work loose. In the case of a machine running on kerosene the carburetter is a rather more complicated piece of mechanism, but even so there is very little that can go wrong and cause trouble. The parts of the instrument that require the most frequent attention are the fuel filter, the air filter, the needle valve, the float, and the jet.

No matter what grade of kerosene or petrol be bought it always contains a certain amount of impurities. These consist of solid particles and drops of water. The presence of either of these in the carburetter will result in a stoppage of the fuel supply. With care, however, there is no reason why they should be permitted to enter the instrument. Special gauze-fitted funnels are sold for straining the fuel when it is being poured into the tank, but when petrol is the fuel used chamois leather will be found a more satisfactory filtering medium. On no account should the fuel ever be poured direct into the tank. By so doing one is asking for trouble. Every tractor is fitted with a filter between the tank and the carburetter, but, generally speaking, these are inadequate in size. A small filter means that the attendant must pay extra special attention to cleaning it. In many cases this is necessary three and four times a day. There are, however, a number of excellent filters on the market that can be bought and fitted to practically all makes of farm tractors.

A number of tractors are now fitted with an additional device for removing impurities. A narrow trough or sump is provided in the bottom of the fuel tank. The trough is sloped and at the lowest end a drain cock is fitted, this being below the level of the outlet pipe leading to the carburetter. The impurities are heavier than the fuel; hence they sink and collect in the trough. The drain cock should be opened before the day's work starts, since this allows time for the impurities to settle over night. The fuel that is drained off—only a very little is taken away on each occasion—need not be wasted. It can always be used for cleaning purposes.

A stoppage of the flow of fuel is sometimes caused by an accumulation of solid matter in the pipe leading to the carburetter. If the unions be disconnected the obstruction can usually be removed by blowing. Another cause of a stoppage in the fuel supply is what is known as an air-lock. This, as its name implies, is the presence of air in the fuel pipe. It is never experienced when the pipe is bent in the proper manner; therefore, if fitting a new pipe, see that it is curved in exactly the same way as the original one. An air-lock can generally be taken out by removing the filler cap on the tank if the fuel be pressure fed. This must, however, be done slowly, so as to reduce the pressure before it is finally taken off. Failing this the fuel will spurt out in a strong stream. In other cases blowing through the pipe will force out the air. Some tractor operators have a habit of sucking the fuel up through the pipe; this is bad, since neither kerosene nor petrol are wholesome.

Reference has been made before to the air filter; therefore, this part of the system calls for no further comment. The orifice in the jet as supplied by the makers is sufficiently large to allow of an adequate supply of fuel to the vaporiser. A too large jet opening will cause the mixture to be too rich, and, on the other hand, a too small jet will starve the engine. It is seldom necessary to tamper with the jet, excepting to clean it from time to time. If it ever be necessary to fit a new one this should be of the same size as the original. No matter how carefully the fuel be strained it is next to impossible to prevent some dirt or foreign matter reaching the carburetter. A minute speck of dirt may lodge in the jet opening and stop the flow of fuel. A key is provided in the tool kit for removing the jet. This should be cleaned by blowing alone. If an attempt be made to remove the obstruction by means of a piece of Bowden wire the jet opening may easily be increased, in which case the setting of the carburetter is destroyed.

Care should be taken to ascertain the level of the fuel in the float chamber. The correct level is three-sixteenths of an inch below the jet opening. Various makes of carburetter differ, but in the vast majority of cases the position of the float can be corrected quite easily. In some instances the adjustment is made by a special screw acting on the jet, raising it or lowering it according to whether the level is too low or too high.

* In the "Farmer and Settler."

## REPAIR JOBS FOR THE FARM WORKSHOP.

The farm tractor operator frequently finds it necessary to use sheet metal of one kind or another when effecting repairs. Sheet metal of various gauges of iron, steel, and brass should be kept on hand. For making washers, clips, packing pieces, and the like they are indispensable. A necessary tool for cutting is a pair of stout metal-cutting shears. Metal, except temper steel, of any thickness up to three thirty-seconds of an inch can be cut with the shears. Heavier gauges of metal should be cut on an iron block or anvil with a cold chisel and heavy hammer. A guiding line should, of course, be made first with a steel scriber point, this being done on both sides of the sheet.

If very thick metal has to be cut it may be sawn in some cases; failing this, a row of small holes should be drilled close together along the cutting line. The metal between can then be cut with the chisel quite easily. The edges of the metal, whether cut by shears or chisel, should be trimmed by filing.

### Using a Hacksaw.

Two kinds of blades should be bought for the ever-useful hacksaw. Some should have fine teeth; the others coarse. The former are employed for cutting iron and steel, together with brass tubes; the latter for softer metals, such as brass. Extreme care is necessary when using the hacksaw; otherwise a large number of blades will be broken. The blade must always be kept at right angles to the work and moved in a perfectly straight line. Hacksaw blades cut in one direction only. Pressure should, therefore, only be brought to bear on the blade when moving in the cutting direction, the direction depending, of course, on the way in which the blade has been fitted.

### Dies and Taps.

Dies and taps are expensive tools, but the tractor owner is advised to purchase a set, especially if he be at some distance from the nearest stores. Otherwise they should be bought as required. British tractors are invariably fitted with nuts and bolts with what is known as the Whitworth thread. American tractors are fitted with special threads, these generally being 24 to the inch up to $\frac{3}{8}$-inch bolts, with 20 threads to the inch for larger ones. Other machines make use of the millimetre sizes.

Dies and taps must be used carefully, especially the latter. Plenty of oil is needed when screwing iron or steel and the thread should only be cut in a clockwise direction. If there be a tendency to stick a half turn back should be made and then on again in the right direction, it is a mistake to turn violently in both directions, since this spoils the cutting edges. On no account should an attempt be made to screw or tap a hardened metal. It should be softened by heating before beginning operations.

### The Art of Filing.

Filing is one of the most difficult jobs in the tractor garage to do in a proper manner. It is not nearly such an easy task as the majority of novices imagine. The handle of the file should be held in the right hand and the extreme tip by the fingers and thumb of the left hand. Filing should begin from the tip and proceed towards the handle. At the beginning of the stroke the greatest pressure should be applied at the tip and the least at the handle. As the stroke proceeds the pressure should be relieved gradually at the tip and increased at the handle end. At the middle of the stroke the pressure should be equal at each end; at the end of the stroke the bulk of the pressure should be at the handle end. On returning the file to its original position it should be lifted off the work.

The equipment of files should include flat, half-round, square, round, and three-cornered ones of medium and fine cut. A separate set of files should be kept for working with brass and other soft metals, since hard metals, such as iron and steel, soon take off the cutting edge. A file brush of steel wire should be part of the equipment. This is essential for keeping them in proper order.

### Removing a Broken Stud.

This is a job that sometimes taxes the ingenuity of the tractor operator. He possesses no special tools for the purpose, and is at a loss to know how to proceed. If there be a part projecting this should be filed flat on two sides and gripped with a pair of pliers or with an adjustable spanner. An alternative to this is to

make a cut across the top with a hacksaw so that it can be removed with a screwdriver. If neither of these plans can be adopted, owing to there not being sufficient of the stud projecting, a hole should be drilled vertically in the stud and the tang of a file inserted. The file can be gripped in a spanner and the stud unscrewed. If a considerable portion project the simplest plan is to screw on a nut and a locknut. By applying a spanner to the lower nut the stud can be unscrewed without any trouble. When inserting a new stud the same method can be followed, but in this case the top nut should be screwed down.

## CARE OF THE CAR.

The outstanding advantage of the Duco finish to the motor-car is the ease with which it may be kept clean and "new." Duco is the hardest, toughest, and most durable finish developed, but if the owner desires to keep his car looking as it did when delivered to him, the finish must not be abused, and the following suggestions are offered to the purchaser of a Duco-finished car:—

The car should be cleaned at reasonable intervals. Although it is possible in some instances to clean with a dry cloth, it is usually best to wash the finish if the car is very dirty, particularly if grit or small sand particles be present. Should the finish, after washing, appear gray or white, thorough polishing is required and Duco Polish No. 7 is recommended for this purpose.

Care should be taken that no alcohol or mixture containing alcohol is spilled on the Duco finish, but if this does occur, it should be immediately wiped off.

The Duco finish will usually resist the action of dilute acids such as are present in battery solutions, but it is advisable to exercise care in keeping any acid, dilute or full strength, from the finish.

If the car be only dusty, the dust may be removed with a dry cloth, and the polish then applied. If the car be dirty, however, it should be washed and dried before the polish is applied. A dry, clean cloth should be used in rubbing off the polish, and with thorough rubbing a fine lustre will be obtained. If in cleaning and rubbing traces of the colour remain on the cloth, the owner need not be alarmed, as this represents a weathering or wearing action and does not appreciably affect the life of the finish.

As upholstery material in closed cars is exposed to dirt and weather conditions, it is desirable, at least once a month, or more frequently if necessary, to clean the upholstery with a vacuum cleaner and a stiff hand broom. If the material becomes spotted, a cleaning fluid may be used for removing the spots, and when this has thoroughly evaporated, a hot flat iron wrapped in a wet cloth applied. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position. Floor carpets may be cleaned by rubbing with a sponge soaked in petrol.

Leather upholstery may be washed with pure soap and water, rinsing off the soap and drying with a moist chamois. Petrol should not be used on leather upholstery.

To remove dust or dirt on the outside of the top a sponge and soap suds might be used, rinsing with clear water and then drying with chamois. Petrol or oil of any kind should not be used, as these will injure the fabric and dull its lustre. When curtains are wet, they should be allowed to dry before being folded and put away.

The inside of closed model tops may be cleaned by brushing briskly with the nap, using a vacuum-cleaner if available.

*AN INFORMATIVE JOURNAL.*

*A Downs farmer writes (10th November, 1929), appreciatively of "The informative and instructive matter appearing monthly in the 'Queensland Agricultural Journal.' . . . It is very helpful to those farmers who wish to run their farms on intelligent and scientific lines."*

# Answers to Correspondents.

## FRUITGROWING.

*Selected from the outward correspondence of the Director of Fruit Culture, Mr. Geo. Williams:—*

### A Prolific Lemon Tree.

J.M.A. (Yalleroi) writes—

"Is 251 dozen lemons from one tree (Lisbon) in one season, anyway approaching a record? The lemons were picked between February and September, and were all well above the average-sized lemon bought in shops. Also, is the size of the tree unusual? The spread of the branches is, roughly, 18 feet in diameter. We have had continuous good crops from this particular tree, but this was a record for it. The tree is eighteen years old."

We cannot say that this production from one tree is a "record," but it is a very remarkable yield.

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## BOTANY.

*The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—*

### Fodder Trees and Shrubs.

V.J.B. (Oakey)—

Some of the most useful fodder trees are—Portuguese Elm (*Celtis sinensis*), Bellasombre Tree (*Phytolacca dioica*), Kurrajong (*Sterculia diversifolia*), and Weeping Myall (*Acacia pendula*). We believe seeds of the Bellasombre Tree may be obtained from Mr. R. Dick, Purga, via Ipswich. The seeds of Kurrajong and Weeping Myall may be obtained from Messrs. A. Murphy and Sons, Woy Woy, New South Wales. The seeds of the Portuguese Elm are not available this season.

### Twiggy Mullein.

E.T. (Maleny)—

Your specimen is known as the Twiggy Mullein (*Verbascum virgatum*). It is a stiff, erect-growing plant of an annual duration; it is a native of the Mediterranean regions and Western Europe, and is now naturalised in Australia. It is a fairly common weed in Queensland but is not very aggressive. It has no particular value.

### Prickly Poppy (*Argemone mexicana*).

A.J.C. (Yarraman, Brisbane Valley Line)—

Your specimen is the Prickly Poppy (*Argemone mexicana*). It is a weed, and sometimes a serious pest, and has been suspected at times of poisoning stock. It would be as well to eradicate it from your lucerne patch as it might become a harmful ingredient in hay cut from the cultivation in which it occurs.

### Plants from the Eungella Range.

W.G.H. (Mackay)—

The specimen you send is *Crinum pedunculatum*. We have no data as to the regularity of the flowering of *Albizzia toona*. Some years ago when we visited the Eungella Range we saw one large tree of this species at the foot of the range. It was leafless at that time (October). Is this common to the species or do you think the tree we saw was exceptional in being deciduous?

### Fertiliser Mixtures.

T.M. (The Summit, Southern Line)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises as follows:—4-8-10 means that the mixed fertiliser contains 4 per cent. of nitrogen, 8 per cent. of phosphoric acid, and 10 per cent. of potash. See page 18 of pamphlet "Complete Fertilisers." There is very little gained by making your own mixtures, as all fertilisers are strictly charged for on the percentage of fertilising constituents they contain (page 53).

**Plants Identified.**

G.R. (Beechmont)—Your specimens are—

The little shrub with rather strongly-scented leaves and lavender flowers, *Prostanthera ovalifolia.*

The twining plant with blue flowers is *Comesperma volubile.*

The little shrub with yellowish flowers is *Pomaderris elliptica.* These Pomaderris shrubs are very handsome when in flower and a number of species occur in Queensland. We were very glad to see the specimens, as we intend to revise the Queensland species of the genus when we get enough material, as we think there are more than one species that go under the specific name of *elliptica.*

The Hop Bush is *Dodonæa megazyga.* We were also very glad to get this, as we only had specimens once before, collected by the late Mr. Schneider, from the Upper Nerang.

G.M. (Rabaul, Territory of New Guinea)—

1. *Flemingia strobolifera.* Family Leguminosæ. A shrub common in India, the Malayan Archipelago, and New Guinea. I was interested to hear of the value as food to stock.
2. Two specimens were included in this parcel; the larger was *Stachytarpheta dichotoma,* very common in Queensland and known here as Snake Weed. The smaller specimen was *Hyptis suaveolens,* a common tropical weed of the family Labiateæ. It is a native of tropical America and is now found in most tropical countries, including Queensland and New Guinea.
3. *Alysicarpus vaginalis* (syn. *A. numnulariæfolius*).

**A Text-book on Botany.**

A.F.S. (North Isis)—

A book you might find useful is Mr. C. T. White's elementary text-book of Australian Forest Botany, published by the Government Printer, New South Wales, price 7s. 6d. This may be useful to you, as the examples quoted, illustrating various terms, are mostly Queensland species. Other Australian text-books are—one by Dende and Lucas, and another by Mrs. Brewster and Le Plastrier. Any bookseller could be able to supply you with them. The price is about 4s. or 5s. for each book.

Of text-books published outside Australia, one of the best is F. W. Oliver's Elementary Botany. The one used by the Queensland University is Lowson's text-book.

If you wish to get a knowledge of the local plants we should say a good plan would be for you to collect specimens and forward them here for identification.

Later, if you feel inclined, you could obtain a copy of the Queensland Flora, by the late F. M. Bailey, price 30s. a set of six volumes. This contains descriptions of all Queensland plants known up to the date of publication.

**Plants Suspected of being Poisonous to Stock.**

Some time ago we received some specimens suspected of poisoning a cow and heifer on a Toowoomba property. The specimens are—

1. *Jacaranda mimosæfolia.* The common jacaranda, native of South America, widely cultivated in Brisbane as a garden tree. It is not known to be poisonous in any way.
2. *Acacia* sp. Not specifically determinable without flowers or pods. The wattles or acacias are not generally regarded as poisonous except the pods of some species containing a saponin and regarded then as being poisonous, but no pods were borne on your specimens.
3. *Owenia acidula.* Emu Apple or Colane. A very handsome native tree common to the Downs; is not poisonous.
4. *Ligustrum lucidum,* the common species of privet, cultivated as an ornamental tree on the Downs. If the beasts were really poisoned, this may have been the cause of the trouble, as privets are generally regarded as poisonous, containing a bitter poison, glucoside. It is, however, a very common tree, cultivated everywhere on the Downs, and we have had no cases brought under our notice previously of stock eating it with fatal effect.

**Analysis of "Native Pomegranate."**

A.C.C. (Barcaldine)—

The parcel of creeping vines was handed to the Agricultural Chemist, Mr. J. C. Brünnich, whose analysis is as follows:—

Analysis of shrub *Capparis Mitchellii*, sometimes known as Native Pomegranate—Crude fat (on water-free material) = 3.0 per cent. Contains no appreciable amounts of essential oils and no motor spirit or oil.

**Heart-Leaf Poison Bush.**

"Coreena" (Barcaldine, C.Q.)—

We received your specimens of Heart-Leaf Poison Bush and regret to state that we are not in a position to be able to inform you definitely at what stage of the plant's growth it is not poisonous. A good deal has been said about this plant's being poisonous only at certain times, but up to the present we have no definite proof of the correctness of such statements.

The question of the poisonous character of this and many other plants is an exceedingly complex one. Mr. Brünnich, the Agricultural Chemist, has found an alkaloid in the Heart-Leaf Poison Bush, but so far the conditions which govern the appearance in the plant of this alkaloid are obscure. The botanical name of the Heart-Leaf Poison Bush is *Gastrolobium grandiflorum*.

The other specimen you sent, similar to Heart-Leaf Poison Bush, but with a long leaf which is silky on the under side, is *Grevillæ Goodii*. This plant has been sent in here as a poison plant. There is a possibility, however, that it has been mistaken for the Heart-Leaf Poison Bush.

## PIG RAISING.

*(Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.)*

**Pig Feeding.**

H.E.J. (Upper Caboolture)—

Apparently your pigs are suffering from a severe form of constipation and from lack of a regular and sufficient green food and clean drinking water. It is evident your system of feeding is at fault somewhere, and we believe the balancing up of concentrates with a sufficiency of green foods and drinking water will overcome the trouble.

**Asphalt.**

O.S.W. (Mondure)—The City Engineer, in answer to a similar query some time ago, favoured us with this reply:—

The term asphalt has a wide range, and is used to denote bitumen. Asphalt, which is composed of bitumen as a binder used to hold or cement the aggregate (particles of sand, stone, chips, &c.) together, and even when tar is used as a binder the resultant mixture is termed asphalt.

If the word tarpaving is substituted it makes the necessary distinction. I presume tarpaving is what is meant. If your correspondent is in a district where a stone crusher is at work and can get the run of crusher aggregate—i.e., material as it comes from the crusher—and separates sufficient material for his work that will pass through a three-eighth square mesh sieve, the desired grading will be obtained.

If, on the other hand, he has to make up the aggregate it will be necessary to procure 100 per cent. material passing a three-eighth square mesh, 30 per cent. of which shall be retained on one-eighth mesh, 15 per cent. on 20 mesh, and the balance of 45 per cent. will grade down to the finest sand or stone dust procurable to which 10 per cent. of tar shall be added. If the aggregate can be brought to within 10 or 15 per cent. of these figures a good mixture should result.

The tar should be poured into a flattened heap and raked over with a stiff rake till properly mixed. The tar should be boiled to the proper consistency or, better, distilled or prepared tar purchased.

The mixture will require from 18 to 23 gallons of tar per cubic yard of aggregate, depending upon the amount of fines contained therein. The finished surface should be dusted with dust or fine sand.

# General Notes.

## Staff Changes and Appointments.

The Officer in Charge of Police, Wondai, has been relieved of the appointment of Acting Inspector of Stock as from the 9th November, 1929.

The Officer in Charge of Police, Milmerran, has been appointed an Acting Inspector of Stock as from the 2nd November, 1929.

Constable M. Bourke, of Mount Molloy, has been appointed a Slaughtering Inspector as from the 19th October.

Mr. E. Rowlings, of Inglewood, has been appointed Government Representative on the Dingo Board for the Western Downs District, vice Mr. A. R. Charles, resigned.

Constable J. J. Codde, of Eulo, has been appointed a Slaughtering Inspector as from the 28th October, 1929.

Messrs. L. A. Dollery, G. Barber, and H. Holzapfel, of Cleveland, have been appointed Honorary Rangers under the Animals and Birds Acts.

The District Inspector of Stock, Rockhampton, has been reappointed Government Representative on the Gogango Dingo Board.

Mr. E. N. Goldsworthy, Superintendent of the Lazaret, Peel Island, has been appointed an Honorary Ranger under the Animals and Birds Acts as from the 2nd November, 1929.

Messrs. J. J. Tracey, R. Craig, and G. F. Moorhouse, of Currumbin, have been appointed Inspectors under the Diseases in Plants Acts as from the 2nd November, 1929.

Mr. L. F. Mandelson, of the Queensland University, has been appointed Assistant Pathologist, on probation, Department of Agriculture and Stock, as from 1st January, 1930.

Mr. P. J. McCauley, of Neurum Creek, has been appointed an officer under and for the purposes of the Animals and Birds Acts for the newly-proclaimed Sanctuary at Neurum Creek.

Messrs. A. C. P. Nurcombe, E. Widdup, D. F. Kay, P. J. Manuell, J. Byron, and W. J. White, of the Cotton Section, Department of Agriculture and Stock, have been appointed Assistant Graders (Senior) of the Cotton Section. Mr. W. A. R. Cowdry has been appointed Field Assistant, Cotton Section, as from 1st July, 1929.

## Beware of Disease.

"Typhoid inoculation is no substitute for sanitary precautions, and the more highly civilised the community and the better use made of the knowledge of sanitation the less typhoid fever results.

"A warning note must again be sounded against the inactivity of rat prevention work and the ever present danger of plague visiting our shores. One match can start a conflagration, and one plague rat can start an epidemic."—From Annual Report of the Commissioner of Public Health.

## Sugar-cane Growers' Defence Fund Levy.

A referendum to decide the question of the making of a levy for defence fund purposes by the Queensland Canegrowers' Council on all growers of sugar-cane, at the rate of 1d. per ton of sugar-cane harvested during the season ending on the 28th February, 1930, was conducted at the Department of Agriculture and Stock to-day with the following result:—

| | Votes. |
|---|---|
| For the levy .. .. .. .. .. .. .. | 1,914 |
| Against the levy .. .. .. .. .. .. .. | 1,591 |

This levy will be deducted by the managers of the respective sugar-mills from cane payments due by such mills to growers delivering their cane to such mills. The levy will be utilised in the following manner:—

Seventy-five per cent. for a defence fund to be used in assisting growers in cases of serious industrial trouble; in advertising; in compensation for injury caused by arson; and for other purposes such as legal expenses of vital importance to the sugar industry. The other 25 per cent. will be distributed amongst the various District Canegrowers' Executives to be utilised by them for local defence purposes.

### Soil Surveys.

The Minister for Agriculture and Stock (Mr. H. F. Walker) has given notice in the Legislative Assembly that he would ask the House to consider the desirableness of introducing a Bill to authorise the entry of certain persons on to land for the purpose of making soil surveys of the State.

### Foxes in Captivity—Penalty Imposed.

The Minister of Agriculture and Stock (Mr. H. F. Walker) has drawn attention to a practice which constitutes a distinct breach of a regulation under "*The Dingo and Marsupial Destruction Acts*, 1918-1923," for which a substantial penalty is provided. This refers to the keeping of foxes in captivity, and the insertion of newspaper advertisements to the effect that they are held for sale.

In view of the menace of the fox, particularly to the poultry industry, a bonus is offered by Dingo Boards for their destruction, and their capture for sale is therefore a matter which is viewed seriously by the Department of Agriculture and Stock, who will take the necessary action to deal with any further breaches of the regulation.

### Mammitis—Departmental Service Appreciated.

Mr. J. W. Newbery, Clovelly, Kowguran, writes:—". . . Many dairy farmers suffer great loss through contagious mammitis, about the worst scourge that can befall his dairy herd. I was badly hit by this scourge two or three seasons ago, but stamped it out of my herd by inoculating all my cows—about 100 altogether—with an autogenous serum prepared from milk from affected cows in my herd by the Government Bacteriologist, Mr. C. J. Pound, and I would strongly advise any dairy farmer similarly afflicted to adopt this remedy. The Agricultural Department acts most generously in supplying the serum at a nominal cost, and the inoculating process is so simple that any farmer can do it if he takes ordinary precautions as to sterilisation and follows the instructions so clearly set out in the leaflet supplied with the serum."

### Is this a Fact? A Point for Fruitgrowers.

A guest at a Canberra hotel, who recently asked to be supplied with Australian preserved fruit instead of imported fruit, has informed the Minister for Trade and Customs (Mr. Fenton) that he was told that the hotel stocked only foreign preserved fruit. Mr. Fenton's informant added that it was rarely that Australian fruit was served in Australian hotels. Mr. Fenton, discussing the matter, said that it seemed extraordinary that in a country such as Australia, which grew some of the best fruit in the world, and where the preserving industry was so well advanced, the proprietors of hotels preferred to serve fruit brought from overseas. He would even be in favour of a boycott of the establishments which were so unpatriotic. If people would adopt a more Australian point of view there would be no difficulty in disposing of Australian preserved fruit. He could not understand the view taken by people who demanded the foreign product.

### The Royal Society of Queensland.

The Ordinary Monthly Meeting of the Royal Society was held in the Geology Lecture Theatre of the University on Monday, 28th October. Professor J. P. Lowson, M.D., was in the chair, and about thirty members were present.

Miss D. Hill, B.Sc., read a paper entitled "The Stratigraphical Relationship of the Shales about Esk." The work indicated that the Esk Shales of the Ipswich coal measures represent closely related phases in a shallow fresh water basin, with but a slight chronological difference. For in effect the Basal Conglomerate of the Ipswich series changes laterally into the highest of the Esk series—the Esk shales. Both these are conformably underlaid by a volcanic stage. The Ipswich coal measure shales thin out rapidly northward and are missing from the basin north of Bellevue, where the overlying Bundamba comes to rest without apparent unconformity on the Esk Shales. The paper was discussed by Professor Richards, Drs. Bryan, Marks, and Whitehouse, and Messrs. Jones, Reid, and Tommerup.

Mr. Inigo Jones exhibited slides of the 1893 flood of the Brisbane River and maps of the area affected.

Dr. F. W. Whitehouse exhibited Bryozoa from the Lower Carboniferous limestones of Riverleigh, near Mundubbera. These included two species of *Archimedes* (genus new to Australia) and one of *Evactinopora* (genus new to E. Australia). The limestone with *Archimedes* contains the *Amygdalophyllum* coral fauna. The *Evactinopora* limestone is probably somewhat higher in the section.

### Salt for Pigs—Warning against an Excessive Supply.

A warning against allowing pigs access to unlimited quantities of salt was given a few days ago by the Stock Inspector for the Casino district (N.S.W.), Mr. L. W. Devlin, who stated that he was called in recently to inspect a sow that subsequently died. Mr. Devlin found that a pig skin that had been salted in the process of tanning had been stretched over a log in the pig yard, and the sow had licked off a large quantity of salt, thus causing her death.

### Southern Agents—A Business Hint to Fruitgrowers.

The Department of Agriculture, New South Wales, advises that instances have recently come before its notice in which Queensland fruitgrowers have consigned fruit for disposal in New South Wales, and have subsequently had difficulty in receiving the proceeds due to them.

Before consigning fruit to New South Wales agents, growers may, by communicating with the Registrar of Farm Produce Agents at Sydney, obtain information as to whether such agents are licensed under the Farm Produce Agents Act.

### Hail Insurance Fund.

An amendment has been made to the Hail Insurance Reserve Fund and Hail Insurance Scheme Regulations under the Wheat Pool Acts. The object of these alterations is that the maximum of the reserve fund provided for in the original regulations which were passed in July, 1926, be increased from £10,000 to £20,000. In the old regulations it was provided that every grower should carry his own hail risk to the extent of the first 10 per cent. of the crop on the area damaged. This regulation has now been amended to read that every grower shall carry his own hail risk to the extent of the first 5 per cent. of the crop on the area damaged on each individual plot.

Provision is made to give wheatgrowers the opportunity of demanding a poll as to whether or not either or both of the above amendments shall be carried. In that connection a petition signed by at least 200 growers of wheat who delivered wheat to the Board for the 1927-28 or 1928-29 seasons must reach the Minister on or before the 17th December, 1929.

### Fruit Drink Standards—Analyst's Comments.

The following excerpt from the Annual Report of the Government Analyst, Mr. J. B. Henderson, will interest citrus growers particularly:—

Of twelve samples of orange cordials examined, seven passed the fruit cordial standard, which requires the presence of not less than 20 per cent. of fruit juice. The aerated orange beverages on the market contained from nil to 10 per cent. of orange juice. The orange drink stalls were found to be dispensing a beverage containing about 10 per cent. of orange juice. The present popular demand for pure fruit drinks is one of the most beneficial national dietetic advances of recent years. Our most important fruits from the standpoint of vitamins are tomatoes, lemons, oranges, and bananas. Every one of these fruits contains at least four vitamins—namely, A, B, C, and D. These vitamins are the antirachitic, growth, antiscorbutic, and antineuritic "factors." It is important from the aspect of national health and the interests of our orchardists that the use of pure fruit drinks should be fostered in every possible way. A regulation appears to be necessary stipulating for a minimum proportion of, say, 5 per cent. of orange juice in orange beverages and the elimination of preservative and artificial colouring from all drinks sold over the counter for immediate consumption and purporting to be made on the premises from fresh fruit juice.

### Other Points from the Analyst's Report—A Fat Reducer at about £5 a Pint.

Of twenty-two samples of minced meat and sausages examined thirteen samples failed to meet the standard in regard to preservative, the excess of sulphur dioxide in the sausages ranging from 2 to 243 per cent. Preservative is now forbidden in minced meat.

Three samples of chewing gum contained drugs in the form of acetylsalicylic acid and phenolphthalein. This method of administering drugs is undoubtedly dangerous.

A sample of soap, sold at a fabulous price, and described as flesh reducing, was found to be ordinary toilet soap adulterated with talc. A liquid preparation for reducing adipose tissue consisted of alcohol, soap, and camphor. The selling price of this simple mixture worked out at nearly £5 per pint.

### Animals and Birds Sanctuary at Neurum Creek.

An Order in Council has been issued under the Animals and Birds Acts declaring that the Camping and Water Reserve 169, parish of Durundur, and an area of one-quarter of a mile on each side of that portion of Neurum Creek situated in the reserve and in portion 4, parish of Byron, shall be a sanctuary under the Animals and Birds Acts. This camping and water reserve is at Neurum Creek on the main Kilcoy-Woodford road, and is a favourite picnic spot.

### Colour Standards for Tomatoes.

The Regulations under the Fruit and Vegetables Act have been added to by the making of provision for standards for the colour requirements for tomatoes. The amendment provides that the following colour definitions shall apply to this fruit:—

"Ripe": To include tomatoes fully coloured;
"Coloured": To include tomatoes showing colour but not fully coloured;
"Green": To include tomatoes showing no colour but conforming to the prescribed maturity standards.

The object of the Regulations is to insure that all the tomatoes in each individual case shall be of a uniform degree of ripeness.

### The Millaa Millaa District.

Mr. H. Mure Robertson, formerly Auditor-General, has been spending six weeks' holiday with his son at Millaa Millaa, and speaks highly of the potentialities of that district. "During my twenty years' service as an audit inspector," he writes, "I visited every town and district in this State many times, and I consider that in respect to climate, soil, permanent mountain streams, liberal rainfall, and natural advantages the Millaa Millaa district is unsurpassed in this State. The average altitude of 3,000 feet ensures a favourable climate with cool nights. Bartle Frere and Bellenden-Ker on the left and Father Clausey on the right attract a generous rainfall, with the result that this district always enjoys a bountiful supply of green feed and water for stock. As a tourist or health resort Millaa Millaa has many attractions—one could dwell indefinitely on the beauties of the district. At present tourists do not come further than Yungaburra, or Malanda, yet as regards scenery I think that the drive from Millaa Millaa to Ravenshoe over the range is equal to the famous drive over the coastal range from Yungaburra to Gordonvale. Although by rail the distance from Millaa Millaa to Innisfail is 155 miles, it is only about 30 miles in a direct line, and when the road now under construction is completed the Millaa Millaa district will then come into its own both as a dairying centre and as a tourist and health resort."—"The Courier."

### Contamination of Cabbages—Dangers of Arsenate of Lead.

From the last Annual Report of the Government Analyst, Mr. J. B. Henderson:—In last year's annual report it was noted that arsenate of lead had been found in cabbages in dangerous proportion. The Food and Drug Regulations provide for no arsenic or lead in vegetables. A number of growers, particularly in one district, took no notice of the warnings given, and a number of consignments of cabbage contaminated with arsenate of lead have been seized in the markets and destroyed. Many of these cabbages contained comparatively high amounts of arsenate of lead, four containing between fifteen grains and seventeen grains of arsenate of lead. One on which the white stains of arsenate of lead were freely visible was boiled with salt and a little soda exactly as in an ordinary household. After straining it was found on analysis that the arsenate of lead as a result of the boiling had become evenly distributed throughout the cabbage and the water. The total arsenate of lead present was 15 grains. An ordinary helping of about 3 oz. of this cabbage would contain 0.25 grain of lead (calculated as metal) and 0.375 grain of arsenic (calculated as $As_2O_5$). Children are being advised at school to drink a cupful of cabbage water when they get the chance—probably for the vitamin content. A cupful (say 9 oz.) of water from this cabbage would contain 1.1 grain of lead (calculated as metal) and 0.6 grain of arsenic (calculated as $As_2O_5$), and the maximum medicinal dose of arsenic for an adult is only 0.06 grain. It is quite evident that there must have been cases of fairly acute poisoning from some of these cabbages. The symptoms of gastric and intestinal irritation in such cases occurring after a meal would not unlikely and not unnaturally be classed as "ptomaine poisoning." There would also be a certainty of chronic lead poisoning if such contaminated cabbages were regularly used as a food. The drastic but necessary destruction of contaminated consignments will probably put an end to this highly dangerous practice.

### Lead in Soda Water.

From the same report: Of 119 samples of soda water examined, sixty-nine samples contained lead at the rate of $\frac{1}{100}$th grain or more per gallon. While the proportion of lead has been markedly reduced since 1926-27, it is important from a health standpoint that soda water should be entirely free from such a toxic substance as lead. It would be interesting to know if the country that is supplying carbonators containing lead solder to Australia is also providing its own inhabitants with soda fountain drinks containing lead in solution. Queensland and Palestine are the only countries so far where we have seen the presence of lead in soda water reported.

### Soil Biology—A Successful Research Worker.

Mr. E. C. Tommerup, B.Sc., A.A.C.I., Forest Assistant in the Queensland Forest Service, has been awarded the Commonwealth Research Scholarship in Soil Biology by the trustees of the Commonwealth Science and Industry Endowment Fund.

Mr. Tommerup joined the Queensland Forest Service in 1926, and completed a year's post graduate work in forestry subjects at the University of Queensland. He matriculated in 1922 from the Brisbane State High School. He secured his Degree in Science at the University of Queensland, majoring in zoology, chemistry, and geology. In 1923 he gained the Thomas Morrow prize for a thesis on the application of science to increase agricultural production.

He will commence his studies at the University of Sydney next January, at the completion of which he will proceed to the Rothamsted Experiment Station, in England. He will be absent from Australia for about two years.

Mr. Tommerup is the eldest son of Mr. H. G. Tommerup, of Brisbane and Beaudesert.

### "There is no Finer Workman than the Australian."

"It is somebody's job to strike a note of optimism in Australia," declared Mr. S. McKay, chairman of directors of H. V. McKay Proprietary Limited, Sunshine, Victoria, on his return from overseas recently. "Other countries have their worries, but they do not proclaim them to the world as we do. Australia is certainly passing through a very difficult period, but she can make a good recovery. She has wonderful powers of recuperation. She has been suffering from dry conditions and general depression, but so have other countries. The experience in Australia, however, has shown that good seasons invariably follow bad." Mr. McKay said that Australia possessed the right quality of materials, her steel, leather, and timber, particularly if the last-named were properly seasoned, more than met the requirements for the manufacture of harvesters, as far as quality was concerned. Australian workmen were efficient, skilful, and hardworking, notwithstanding what some people had said to the contrary. "There is no finer workman than the Australian, and, moreover, he possesses initiative. I would not change my staff at Sunshine for any staff that I have seen in America," continued Mr. McKay. The fundamental difficulty is the higher cost of the materials.

### Does the Pioneer Spirit Survive?

Who will deny that Queensland is the land of opportunities or that the pioneering spirit is dead? A letter to the "Brisbane Courier," from Mr. Mure H. Robertson, former Auditor-General of Queensland, who is spending a holiday with his son at Millaa Millaa, North Queensland, is an effective reply to the pessimists concerning the future of the State. Ample room, he declares, is available in the Palmerston district for new settlers, who will have before them the example of many pioneers of recent years. Recently Mr. Robertson visited the homes of a number of settlers, amongst whom were a man and his wife—both accomplished and most intelligent—who, twelve years ago, left Sydney and selected 160 acres of dense scrub land in the Far North. The husband had never before had an axe in his hand, yet he set about to clear just sufficient land to accommodate a tent, in the meantime sleeping in a neighbouring barn. Later, with sufficient clearance, he planted grass to enable a horse to be maintained. In the absence of road communication all supplies had to be carried to the selection by the man and his wife. With the help of aborigines the man cut or sawed all the timber required for the building of a house, and carried from the town all the galvanised iron necessary for a roof and a tank. By dint only of hard work the settler was able to clear all the land and acquire an additional 40 acres, which is now all under grass, supporting a sleek herd of milkers. The couple enjoy excellent health, and have no desire to return to city life. Such are the rewards of grit and hard work.

### Dirty Milk and Cheesemaking.

Dirty milk is one cause of trouble in the butter or cheesemaking dairy. Dairy products of prime quality cannot be made if the milk utilised for them is unclean, because the species of germs that prevail in dirty milk always taint it. It is only the kinds bacteria that are present in clean milk that are of assistance in the manufacture of dairy products. As dirty milk is due to carelessness with the milking cans and other utensils and appliances, this can easily be avoided.

### Girls in Industry.

"I think girls will be used more and more for routine work instead of boys; first because they are less susceptible to monotony than the latter, and next, because the so-called blind-alley job is less of a menace to them than to the boys," declared the Chief Railway Commissioner for New South Wales (Mr. W. J. Cleary), in a paper which he read before the Economic Society. He added that he was not afraid of the economic effect of the invasion of industry by girls, because the eventual effect of this would not be unemployment of men, but a stimulus to men to fit themselves by training for more important work. The result would be a considerable improvement in the standard and quantity of output.

### Aviation in Queensland.

During October machines of the Queensland and Northern Territory Aerial Services Limited carried 242 persons, and freight weighing 2,929 lb., the miles flown being 19,180, making a total mileage since the inception of the service of 968,948. The report of the company states that passengers on the regular route are coming forward steadily, and a useful service is being provided. Passengers between Brisbane and Mount Isa are carried each month; three days' travel time being saved by using the air service. Amongst freights carried for the month were newspapers, fruit, ice, and butter, besides medicines, flowers, car batteries, tubes and tyres, groceries, books, photographs, toy balloons, a gramophone, serum, and dental goods.

### To Protect Haystacks from Mice.

Replying to a correspondent who inquired as to the best method of protecting a hay shed from rats and mice, the Supervising Architect of the N.S.W. Department of Agriculture stated that a barrier of plain iron, fixed on the outside of a wood frame, let into the ground 9 to 12 inches and projecting about 2 feet 9 inches above it, would have the desired effect. Let into the ground as described (in order to prevent the vermin tunnelling underneath it), the barrier is more or less a fixture—that is, it could not be moved to permit vehicles being drawn into the shed except at great trouble. It was recommended, therefore, that gates—comprising merely a panel about 10 feet long and fixed in such a way that they can readily be moved—be made in the barrier where necessary, and that underneath these gates a concrete wall 3 inches thick and 9 inches deep be constructed, the top of this wall to be flush with the bottom of the gate—the whole of the wall, that is to say, being below ground level.

The barrier should be constructed so that only a plain iron surface appears on the outside; therefore attention must be given to the construction at the corners and gate posts. If corrugated iron is employed in lieu of plain iron, curved sheets should be used at the corners, otherwise it is difficult to make a mouse-proof junction.

### Care of the Working Horse.

In most orchards the horse is the main source of power used for drawing the various types of cultural implements used, and in order that such power be at its best (this is quite apart from, but not more important than, the question of ordinary humanity) every care should be taken of the horse, which should never be neglected, as he plays a very important part in orchard economy. Proper and regular feeding, watering, grooming, and stabling should all be attended to, otherwise the animal cannot reasonably be expected to do a satisfactory day's work.

Occasionally some discomfort is caused the animal through want of thought. Some orchardists place a piece of hessian over the mouth of the horse during cultural operations to prevent his biting the trees as he passes along the rows. This hessian muzzle may prove very distressing to the animal, especially in hot weather, and the discomfort can be obviated or minimised by using coarse gauze or netting instead of hessian. The horse is then able to breathe more freely, even when labouring under a heavy load.

Attention should also be paid to the harness, which should fit neatly, and steps taken to prevent any rubbing that may result in painful sores. Special care should be taken in choosing a collar, as one that is too tight is very distressing, while one that is too large is apt to chafe.

### Agricultural Organisation—Minister's Remarks.

Addressing a representative gathering of Lockyer farmers at the Queensland Agricultural College at Gatton on 18th November, the Minister of Agriculture and Stock (Mr. Harry F. Walker) expressed his pleasure at being afforded an opportunity of addressing the farmers of the district. He remembered the early days when, as a result of want of organisation, farmers had to accept low prices and work under adverse conditions. As a result of organisation they had moved along, and, backed up by the departmental experts and research work, there was nothing to prevent them, as a concentrated body of farmers, getting the best out of their industry. He was out to push the organised marketing and selling of their products. Fifteen industries were now controlled by the Commodity Boards that had done splendid work. He asked where would the butter industry be but for the Butter Board or the Paterson scheme? The excellent marketing of wheat, due to the efforts of the Wheat Board, was responsible for the increased areas grown. Speaking of the Agricultural Department, Mr. Walker said he thought farmers did not make use of the department in the way they should. Civilisation had brought many problems to the agriculturist, and the work of the Department of Agriculture was to assist the farmer to solve those problems.

### Home Projects—Work in Gayndah District.

Recently the Director of Education (Mr. B. J. McKenna) attended the Home Projects Club day at the Gayndah Rural School, and he expressed high appreciation of the work which was being done by the club. Mr. McKenna was accompanied by the Assistant Chief Inspector of Schools (Mr. R. McL. Riddell).

Mr. McKenna said that they were met by the school committee and taken by motor-car to the homes of some of the pupils enrolled as club members. The object was to see at first hand the work being carried out in the homes. The arrangements made by the boys were exceedingly creditable, and the housing of poultry and pigs and other farm stock there was on the most approved lines. The ingenuity displayed by some in providing drinking troughs was a tribute to the work being done on the vocational side of the rural school's activity. The various displays at the school were next inspected, a feature being a cupboard project by the girls, which was made at a cost of 7s. 6d. Its contents included jams, preserves, and confectionery, as well as ordinary household requirements, such as bread, scones, and cakes.

Luncheon, cooked by the rural school domestic science section, was served to the visitors. The various exhibits were judged by experts in the different sections, and prizes awarded. The gathering was one of the largest seen in Gayndah. Interesting features were addresses by four boys who were undertaking projects work. Speeches were also delivered by Mr. R. L. Boyd, M.L.A., and departmental officers.

Mr. McKenna said that the club work was having an effect in the district in the way of introducing better breeds of animals and the latest methods of housing and feeding. At the same time, the training in civics was a valuable aid to the pupil.

### A Simple Abortion Preventive.

Mr. A. Levie, county veterinary officer for Derbyshire, reviewing in the "Handbook of the East Devon Milk Recording Society" the information available with regard to contagious abortion, arrives at the conclusion that the predisposing cause of the disease is a shortage of the necessary amount of salts in the blood and tissues of the body, thereby weakening the body resistance to disease. Put this right, he says, and the cause is inoperative. In this he claims to be supported by the success of the following measures adopted at all centres. They consist of giving in the food crude carbolic acid, iodine, rock salt, ground limestone, and cod liver oil, as follows:—

For twenty-four cows take 24 drachms (3 oz.) of a mixture of crude carbolic acid and iodine. Put this quantity in 24 pints (3 gallons) of boiling water; mix thoroughly, then sprinkle this solution from a watering-can all over the food for one meal for twenty-four cows, and mix thoroughly by turning the food over three times. Then give each animal her portion of this medicated food. Do this twice a week.

Put a piece of rock salt in front of each animal to lick at pleasure; a tablespoonful of ground limestone and a tablespoonful of cod liver oil in each cow's food twice a week, but not on the days the carbolic mixture is given. The crude carbolic acid and iodine mixture consists of adding 1 drachm of iodine resublimed to 16 oz. crude carbolic acid.

It will be seen that an endeavour is thus made to supply the required mineral of the body and at the same time to stimulate the activity of the thyroid glands. This gland secretes thyroxin; it is an essential to life. Lacking it the body cannot grow, and if already grown will degenerate and perish.

### The Varying Feeding Value of Chaff.

The feeding value of wheaten chaff depends largely on the class of soil on which it is grown, a rich soil generally producing a chaff of high feeding value. At Coonamble Experiment Farm, New South Wales, it was observed that chaff from hay grown on the rich black soil required very little grain added to make it a sufficient ration for horses. Chaff produced on good soils has not always such an attractive appearance as that which comes from the lighter soils, but if the feeding qualities were better understood the former would be appreciated more highly. To convince the Sydney market that this is so will take time, no doubt, but meanwhile the farmer who has a strong soil can console himself that he can feed his horses well with less grain than if he were located on lighter land.

### The Demand for Good Farm Horses.

We have frequently stressed the fact that, whatever may happen on the big farms and in the cities, there will always, in our time at least, be a demand for good draught horses. Even the tractor manufacturers are now admitting that fact. There was a period in the early history of power-farming when the most extravagant claims were made for the tractor. Now that it has worked its way into a more or less definite niche and has proved its value by means of experiment and trial its sponsors realise that, great as its utility is, it is not economically suitable for scores of the smaller jobs for which the horse is specially adapted.

The only factor that may lead to the ultimate displacement of the horse on the farm is the failure of breeders to keep up its standard. So long as sound, flat-boned types are bred, the type that can step out well and keep the plough, the cultivator, or the drill moving at a good pace without tiring on a reasonable day's work, the place of the draught horse is assured. Those who possess the right stamp of mares should not hesitate to breed from them, for they will find that the demand is there provided they can deliver "the goods."—The "New Zealand Farmer."

### Downy Mildew in Vines.

Where attention has not yet been given to spraying for downy mildew, the operation should no longer be overlooked.

Downy mildew can be controlled by careful and systematic spraying with Bordeaux mixture, and no grower should neglect this excellent type of insurance for his crop. An endeavour should be made to keep a coating of the fungicide continuously on the vine to prevent infection taking place. The principal formula for Bordeaux mixture is as follows:—Bluestone (copper sulphate) 6 lb., lime (freshly burnt) 4 lb., water 40 or 50 gallons. Details of its preparation are the subject of a free departmental leaflet.

It is important to remember that Bordeaux mixture should be applied *before* the disease makes its appearance, in order to ensure adequate protection.

No hard-and-fast rule as to the time of spraying can be laid down. The outbreak of downy mildew is largely dependent upon prevailing weather conditions. In districts liable to black spot the Bordeaux spray (6—4—40) given when the early buds are bursting will also protect the vines for a short period against a very early attack of downy mildew. If the grower finds it unnecessary to take measures against black spot he should apply his first spray for downy mildew (Bordeaux mixture at 6—4—50 strength) when the shoots are about 9 inches long—not later. As new growth appears the vines should be resprayed—roughly at intervals of about two weeks. Generally speaking, downy mildew attacks vines later in the season than black spot, chiefly when the fruit is set. In some vineyards as many as six applications of spray are made. It is important that the Bordeaux should be freshly made when applied.

In abnormally bad seasons Bordeaux mixture made to a strength of 10—5—50 may prove an advantage.

Although sulphur is the recognised treatment for prevention of oidium or powdery mildew, systematic spraying with Bordeaux mixture will prevent this disease from becoming established.

In districts where good lime is hard to procure, washing soda can be substituted and Burgundy mixture made instead of Bordeaux. This spray is made according to the following formula:—Bluestone, 4 lb.; common washing soda, 6 lb.; water, 50 gallons. Burgundy mixture should be carefully made. It is important that it be applied *fresh*.

Burgundy mixture does not adhere to the foliage quite as well as Bordeaux; therefore, wherever possible, Bordeaux mixture should be used.

**Milk Recording in England.**

Volume 12 of the "Register of Dairy Cows" has been published by the Ministry of Agriculture and Fisheries (England). In 1917, the first year of the register, 478 members recorded 13,838 cows, of which 572 qualified for entry. Last year 4,862 members recorded 149,971 cows, of which 13,539 qualified. In the first volume the highest yield was 19,646 lb. milk; in the last it was 24,512 lb. milk. In eleven years the number of cows recorded has increased nearly elevenfold, while the percentage of cows that have qualified for the register has more than doubled. Not only has the progress of milk recording been phenomenal, but production has steadily increased, as a result of the lessons taught by the project. The standards for entry in the register vary for the different breeds, and are:—British Friesians (10,000 lb. milk), Shorthorns, Lincoln Reds, Ayrshires, Blue Albions, and Red Polls (9,000 lb. milk); Jerseys, Guernseys, Devons, South Devons, and Welsh (8,000 lb. milk). The milk yields of the leading cows of each breed are as follows:—Friesians (24,512¾ lb.), Shorthorn (22,868½ lb.), Blue Albion (22,533½ lb.), Devon (22,135 lb.), Lincoln Red (18,920½ lb.), Red Poll (17,965 lb.), Hereford (15,510 lb.), South Devon (15,378¾ lb.), Welsh Black (15,263½ lb.), Jersey (15,028 lb.), Guernsey (14,743½ lb.), Ayrshire (14,449 lb.), Kerry (13,053 lb.), Park (12,739¾ lb.), Gloucester (11,993½ lb.), Dexter 11,130¾ lb.), Aberdeen-Angus (10,802¾ lb.), Sussex (10,110¾ lb.), Longhorn (9,660¾ lb.), Galloway (9,305 lb.). The register is issued (1) to provide dairymen with lists of milk recorded cows with high yields, and of dairy bulls, particulars of which are available under the Ministry's milk recording project; (2) to encourage the keeping of authentic milk records, and the breeding of high-class dairy cattle; (3) to encourage dairymen to use pedigree bulls bred from a proven milking strain. The testing of pedigree herds by the Department of Agriculture of the various States of the Commonwealth has similar objects in view, and is proving equally efficacious.

**Summer Fodders—Effect on Subsequent Wheat Yields.**

Details of an experiment to determine the effect of summer fodder crops on the yields of subsequent wheat crops are given in a recent "Agricultural Gazette" of New South Wales.

In the Cumnock district, where farms are comparatively small and land values comparatively high, and where the rainfall is sound and above the average for wheat-growing districts, and climatic conditions are not severe, the soil could, in some opinions, be made to yield greater returns than those obtainable from wheat alternated with bare fallow in conjunction with sheep grazed on the stubbles and fallows. A fodder crop, it is contended, could safely and profitably be grown before the wheat. With the object of determining this question a departmental trial was commenced in 1925-26 in co-operation with Mrs. J. Berney, of Kildara, Eurimbla, in which certain areas were sown with summer fodders, grazed off, and followed by wheat, in order to ascertain the effect of the summer fodders on wheat yields in comparison with an area of bare fallow.

The total yields for the three seasons, 1926-28, were as follows:—

| | Yield per acre. bus. | lb. |
|---|---|---|
| Wheat after Japanese millet .. .. .. .. .. | 53 | 55 |
| Wheat after Sudan grass .. .. .. .. .. | 60 | 13 |
| Wheat on bare fallow .. .. .. .. .. .. | 63 | 36 |

The aggregate yields for three years, it will be seen, showed a difference of 3¼ and 9¾ bushels in favour of bare fallow as compared with Sudan grass and Japanese millet respectively, which, at 5s. per bushel, represent monetary losses in wheat returns of 16s. 3d. and 48s. 9d. per acre. While the results of the trial extending over a period of three years show that the growing of summer fodders on a fallow prior to the sowing of the wheat or main profit crop has a retarding effect on subsequent wheat yields, states the Senior Agricultural Instructor who describes the trials, the amount of grazing or greenstuff for silage purposes which is obtained from the sowing of quick-growing summer fodders such as Sudan grass or Japanese millet in average seasons more than compensates landowners for the apparent monetary losses previously quoted, particularly in view of fluctuating wheat prices, and the greater attention being paid to the production of fat lambs, &c.

The question as to whether a system such as this would tend to encourage weed growth and the spread of diseases was not considered.

**Colostrum—or "First Milk."**

Colostrum, which is sometimes known as "First Milk" or "Beastings," is the milk secreted immediately preceding and directly after calving. It forms the best and only natural kind of nourishment for newly-born calves, and they should never be denied the "first milk," as it has a special action on the intestinal canals.

Colostrum has a yellowish colour, peculiar smell, and a slimy appearance. After a lapse of from three to five days it assumes the characters of normal milk. During the first few hours after calving colostrum is very rich in solids, and contains characteristic organisms known as colostrum corpuscles, which do not wholly disappear until three weeks after calving.

The percentage of milk sugar is very small, its place being taken by other sugars, while the fat content is extremely variable. Colostrum coagulates on heating, which is due to the high percentage of proteid matter and albumin. The heat test is a reliable one, if doubtful as to the fitness of milk for use in the dairy soon after calving.

The mineral ash in colostrum is present to a greater extent than in normal milk, while the specific gravity is also higher, and varies from 1.046 to 1.079. (Normal milk 1.032). The milk given by cows after calving should not be used for at least four days if for butter-making, or ten days if for making cream cheese. As the composition of colostrum varies so considerably, until it finally assumes the characters of ordinary milk, no two analyses read exactly the same.

Comparing the analyses of colostrum with the average analysis of normal milk, a large percentage of proteids is found. Although the fat content is sometimes more than that in the ordinary milk, yet this is not always the case, the percentage of fat being often similar. Continuing the comparison, average milk contains from 6.60 to 11.80 per cent. more water than colostrum, and less mineral ash.

**To Remove Foreign Bodies from the Eye.**

The commonest foreign bodies in the eye met with in our farm animals are small pieces of straw and chaff. They are light, easily carried and blown into the eyes by the wind, or by snorting or coughing when the animal is feeding.

The foreign body lodging on the surface of the eye (the cornea) sets up an intense irritation and extra secretion of tears. This copious flow of tears from the affected eye is a common primary symptom. If the eye is not attended to at this stage new inflammatory tissue is laid down, and the straw or chaff becomes covered and embedded in this new deposit. As the irritation continues, so does the deposition of this new tissue, until the whole of the surface of the eye is covered with a whitish, opaque film. This is known as opacity of the cornea.

Later, if this irritation does not subside, actual ulceration of the cornea occurs with the discharge of pus. The whole eyeball may now become involved, the pus spreading to the deeper structures and permanently ruining the sight. The eyeball at this stage may become a dirty discharging mass of proud flesh assuming a tumourlike growth.

*Treatment.*—Of the old time treatments none were so barbarous as the pluffing into the affected eye of ground glass, sugar or powdered alum. This cruel irrational practice, which caused great pain and suffering to the animal and often resulted in permanent injury, is now happily rarely practised.

The modern method is as follows:—A chaff or straw on the eye, if noticed in its earliest stages, can as a rule be easily removed. Take a piece of clean, soft rag, a handkerchief will answer the purpose, wrap this around the index finger so that about half an inch of the rag projects in a roll from the tip of the finger. A small quantity of vaseline or castor oil is smeared on the tip of the handkerchief. The animal's head is held in position, and at a suitable opportunity, with a bold stroke, the clothed fingertip is brought smartly across the eyeball over the chaff or straw. As a rule the offending particle will be found adhering to the handkerchief.

The after treatment consists of flushing the eye with a 2 per cent. solution of zinc sulphate, two or three times daily. The animal should be kept out of brilliant sunshine and away from draughts. Solutions of silver nitrate are also used with beneficial results. If the foreign body cannot be located continue flushing the eye with the solution, and in the majority of cases the white opaque film will disappear within the course of a few days.

When foreign bodies such as thorns have lodged in the depth of the eye, or in the case of valuable stock, it is best to seek the services of a qualified veterinarian.—"Practice" in the "New Zealand Farmer."

**Concrete on the Farm.**

*Mixing.*—Concrete should be mixed on a wood, concrete, or other paved floor. If mixed on the ground, soil, grass, and other foreign matter is shovelled up with it and the concrete is weakened; the same result obtains if the mixer walks across the mixing floor with muddy boots.

The mixing floor should be reasonably water-tight, otherwise the liquid cement will escape and impoverish the concrete. Mixing should be done as near the work as possible to expedite the job, and also because wheeling concrete long distances in barrows causes the water and cement to rise to the top and the metal to settle hard in the bottom, necessitating a good deal of scraping out, particularly when the metal and sand are poorly graded.

The proportions of cement, sand, and metal vary according to the work in hand and, to a great extent, with the quality of the sand and metal. For foundations of a cottage, bases for engines, thick retaining walls and the like, use one part cement, three parts sand, and six parts metal of 1½-inch gauge; for walls of a cottage, floors of sheds, verandahs, &c., one part cement, three parts sand, six parts metal of 1-inch gauge; for fence posts, fodder silos, water tanks, &c., one part cement, 2½ parts sand, and five of metal of ¾-inch gauge.

*Gauge Boxes.*—It is unwise and uneconomical to guess at the proportions. For small jobs the ubiquitous petrol or kerosene tin may be used for measuring the cement, sand, and metal. For large jobs, however, it pays to make wooden gauge boxes, which are not difficult to construct. Cement is now usually received in paper bags containing 1 cubic foot. A useful gauge box for a 1-2½-5 mix is 2 feet 6 inches wide, 4 feet long and 12 inches deep. This is filled with metal, and as the amount of sand used is half that of the metal the same gauge box can be used by half filling it with sand. This quantity of metal and sand will require exactly two bags of cement. For a 1-3-6 mix a useful size is 2 feet 8 inches wide, 4 feet 6 inches long, and 12 inches deep. This may be used for the sand by half filling it, and the batch will require two bags of cement.

The gauge box is placed at one end of the mixing floor, and filled with metal; it is then lifted off, and the metal spread out to a depth of about 6 inches. The gauge box is then placed on top of the metal and half filled with sand; it is again lifted off and the sand spread evenly over the metal. The required amount of cement is then emptied on to and evenly spread over the sand, and the whole is turned over with a shovel, not throwing it into a heap but rather spreading it out in a thin layer. By turning back once more, the cement, sand, and metal will, if the turning is correctly done, be well mixed together in a dry state.

The mixture should then be turned twice more while the water is sprinkled on through the rose of a watering can or hose. It is important to add only sufficient water to make a workable mixture. Too much water weakens the concrete; it tends to separate the cement and sand from the metal. When wheeling it in barrows the slurry rises to the top and the metal consolidates on the bottom. Immediately it is tipped, the slurry runs away to the lowest level, leaving a mass of impoverished metal. If the mix is too dry it is hard to spread and pack in position, particularly in moulds.

Well-mixed concrete is spongy, quakes like jelly, leaves the barrows and buckets freely, and is easily spread and worked into position. It does not require tamping; in fact it cannot be tamped or rammed, rather is it consolidated by spading. It tends to consolidate itself, and when cast in moulds will, with a minimum of spading, present a clean, even surface when the moulds are removed.

*Placing in Position.*—Immediately the concrete is mixed it should be placed in its final position. It is necessary to prepare for it by excavating, grading, levelling off, &c., or if it is to be placed in moulds these should be all ready to receive it. The ground should be well sprinkled with water just prior to placing the concrete. Moulds should be painted with a cheap grade of oil so that they will leave the concrete freely when taken down. Concrete will become quite useless if allowed to remain on the mixing board for hours.

It is often necessary to place new concrete or concrete that has set hard on top of the old, as for instance, when building a wall. The joining of new work to old is called bonding, and should be understood—particularly when constructing water tanks, silos, and the like, where a water-tight junction is necessary. It is better to leave the top fairly level and even to sweep it clean, and after flushing it at intervals with water to spread a layer over it ½-inch thick with mortar, consisting of one part of cement to two parts sand. This mortar will lie evenly on the old work and the stones of the new concrete will bed down into it. If the surface of the old work is left rough and only a coat of slurry spread over it, the stones or metal of the old and new work will meet without any matrix or mortar between to bind them together, and a weak and leaky junction is the result.

*Curing.*—In the process of setting or hardening, concrete uses up water, and its ultimate strength will be seriously impaired if this vital constituent is allowed to evaporate through exposure to a hot dry atmosphere induced by the sun, hot winds, or artificially by lighting of a fire in a furnace, oven, &c., before the concrete is quite hard. To counteract the action of the sun and hot winds, concrete floors and similar structures should be covered with bags or sand and kept wet for several days. Walls and the like, are, of course, protected by the moulds for some time, and it is not usual in ordinary structures to take special precautions with these except where severe frost is likely. Frost will interfere with the setting of concrete until it is at least forty-eight hours' old. It is therefore necessary to protect it with dry bags or iron, timber, and the like.

*Rendering.*—Rendering is the term applied to plastering or surfacing with cement mortar, i.e., sand and cement. For floors, the proportions are one part cement to two parts sand. For walls it may be one part cement to three parts sand, but will not then be waterproof; for water tanks, dips, &c., it should be one to two. Rendering is generally laid on from ⅜ to ½-inch thick. If required to be more than ½-inch thick it should be done in two-coat work, the first coat being scratched in criss-cross fashion to provide a key for the next coat.

Rendering must always be applied to well-moistened surfaces. For floors it should be put down a few hours after the concrete is laid, otherwise it will lift off the concrete, and be what is known as "drummy." If it is found necessary to render floors of concrete that is old or has dried hard, or even of brick, it is necessary to soak the surface with water for some hours and to brush over it a slurry of equal parts cement and sand immediately before applying the rendering.

## Faith in the Farm Horse.

With just on forty years' experience as a breeder and user of horses, Mr. William Guskett, of Corowa, New South Wales, expresses the opinion that the horse has no equal for furnishing power for the farm. He cited the case of a neighbour who disposed of his horses and purchased a tractor, but towards the close of his first cropping season he was obliged to put it aside and get a team of horses together to finish his work. As an instance of the economy and long service of the horse, Mr. Guskett stated that he recently lost a mare by death, from which he had had twenty-one years' service, and he has another still going strong at the age of twenty-four. He wonders where a tractor would be at these ages. From the mare that died he had reared several foals, two of which he had sold for £50.

## The Mating Age for Dairy Stock.

Old-time breeders never thought of allowing animals to breed until they had reached full maturity, and consequently they were never stunted in growth by reason of having to perform maternal duties before they had completed their growth, so that they developed bigger frames and produced stronger and better developed progeny.

Breeding from young stock is, of course, a great stimulant to early maturity, and by starting animals to breed young, there is not only a saving of time, but they become better mothers and more regular breeders.

The old custom was never to mate a heifer until she was from twenty-seven to thirty months' old, so that she would be three years' old when she gave birth to her first calf. By that time she had completed her growth, and had all the advantage of age and strength to perform her maternal duties.

Heifers that are put to breed at that early age would suffer no harm if they were allowed a rest between the first and second calf, but as a rule no rest is allowed, and they are kept on breeding as fast as they can, so that they never get any opportunity to make up for lost growth, and, besides, there is a big drain on the constitution.

*TO FARMERS AND ORCHARDISTS.*

*"I should like to see every farmer and every orchardist take the 'Queensland Agricultural Journal.'"—Hon. Harry F. Walker, Minister of Agriculture and Stock, in the course of the debate on the Diseases in Plants Bill.*

# The Home and the Garden.

## OUR BABIES.

*Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.*

### CARE OF BABIES IN HOT WEATHER.

As the weather grows warmer babies need less clothing. In some parts of Queensland the weather is changeable at this season, and the baby's clothing should be regulated by the temperature, not by the calendar. Over-clothing causes sweating, and may lead to irritation and inflammation of the skin. Waterproof coverings over wet napkins are very likely to do this, and they should not be used. When it becomes really hot, the baby will be happier if he wears little or nothing besides a napkin and singlet with all his limbs free, but protected by mosquito-netting against flies and mosquitoes. He enjoys kicking his legs and waving his arms freely, and this is one of the advantages Queensland babies have.

In hot weather babies need rather less food but more water. Let them have water to drink between their feeds. A baby may be thirsty without being hungry, and if you try to satisfy his thirst with milk, which is a food, you may upset him. Be careful in increasing his diet at this season. If he is being fed on cow's milk this should be clean and fresh. As soon as possible after delivery put the milk in a small saucepan, which should be used for this purpose only, and bring it to the boiling point. Unless the milk has been properly pasteurised by a trustworthy process, this should always be done. Freshly boiled or pasteurised milk will keep quite fresh in an icebox for twenty-four hours, but without ice it cannot be expected to keep fresh for more than twelve hours. An icebox can be made of a kerosene tin placed in a box with 3 or 4 inches of dry sawdust all round, and covered by a lid.

#### Diarrhœa.

Babies who are being artificially fed very easily get diarrhœa in hot weather. It may be caused by overfeeding, by unsuitable food or by milk which is stale or dirty. If an artificially fed baby begins to have loose motions, all his food and all his milk should be stopped. He should be given one dose of castor oil to clear out any undigested food, and after that he should have nothing but thin barley water slightly sweetened for twenty-four hours. If then he is not quite well you should get medical advice or take him to the nearest Baby Clinic.

#### Gastro-Enteritis or Dysentery.

This is a serious disease which may begin gradually with loose motions, but sometimes comes on suddenly with fever and much weakness and irritability. The motions may be simply loose at first, but after a time they are seen to contain slime tinged with blood, may be very frequent and attended by much straining. Next month there will be many cases of this disease in Queensland, and some of these babies will die, for this has been so every year. If all our mothers understood how the disease is caused, and why it spreads from house to house, there would be much less dysentery and very few deaths from this cause among our babies.

Dysentery is not caused by the heat. Usually the worst of the epidemic is over before the hottest weather begins, though sometimes it continues right through the summer. Dysentery is not caused by feeding babies on cow's milk, for all disease germs in the milk are killed by boiling or pasteurising. But it is much more common among bottle-fed babies, whatever food they are getting, than among babies on the breast. The disease is caused by dysentery bacilli, and these disease germs are conveyed by flies from closet-pans or other filth to the babies' food. Not only must the food be most carefully protected from flies, but so must the bottles and teats after they have been scalded. Even breast-fed babies are not safe if they have dummies pinned on to their frocks to invite the disease-bearing flies to settle on them.

Protect your baby against this enfeebling, painful, dangerous, and often fatal disease by natural feeding, by avoiding the dangerous dummy, and by carefully protecting its artificial food from infection by flies.

### Barley-water.

To make barley-water, take one tablespoonful of pearl barley, wash it carefully, add to 1 pint of water, and simmer for one hour. Then make up to 1 pint from the kettle, and strain carefully. Prepare fresh twice daily.

## CONSTIPATION IN BABIES.

Breast-fed babies are never really constipated. Their motions are always soft, though they may be passed at long and irregular intervals. This sluggishness of the bowels arises from two causes—(1) Giving castor oil to the baby; (2) want of proper training.

### Castor Oil Not Necessary for the Newborn Baby.

The first effect of castor oil is to empty the bowels. Its second effect is to prevent them from acting. The harmful and unnecessary practice of giving castor oil to a newborn baby starts an irregularity which is kept up and increased by repeated doses of castor oil. There results a condition artificially manufactured by the mother or nurse, which she calls "constipation."

Once or twice a day the baby should be allowed to lie without his clothes, or with only a singlet, and exercise his legs and abdominal muscles by freely kicking, for fifteen or twenty minutes in warm weather. This will often induce a motion. If necessary he must be held out over a pan, just touching its rim. It is a good plan to hold out a baby after each feed. He will pass water, thus keeping his napkin dry, and will often pass a motion. If the baby's training has been long neglected, these methods may not suffice. It may then be necessary to pass a soap pencil dipped in oil, or inject a few teaspoonfuls of plain boiled water into the bowel. Gently kneading the abdomen, beginning low on the right side, upwards to the ribs, across, and down on the left side, should help. Medicines should not be necessary.

### Bottle-fed Babies.

Bottle-fed babies suffer from the same mismanagement and need the same treatment. With them the condition is more troublesome, for cow's milk is often constipating and causes firmer motions, often in solid masses, and sometimes in small round lumps like pebbles. The food may need adjusting, and it would be wise to consult a clinic nurse if possible. See that the baby drinks enough water. He may be taking more milk, especially if this is dried milk, than he should. The substitution of malt-sugar in the form of Mellin's Food, Maltogen, or Extract of Malt, for some or all of the sugar in his food, if often helpful. So is prune juice given as a medicine. If drugs are necessary, fluid magnesia, milk of magnesia, and liquid petroleum oil may be given in teaspoonful doses once or twice a day. No other medicines should be given except on medical advice.

### A Very Important Point.

This is very important. Whatever medicines are given for constipation, much depends on the way the medicine is given. If too large a dose is given, or if it is given every second or third day, or once or twice a week, the irregularity of the bowels is increased, and the constipation may become permanent. The medicine should be given every day at the same time, in just sufficient doses to produce its effect and no more. The dose must be determined by trial. Once a daily regular action has been established, the dose should be slowly made less, and after a time may be left off. Used rightly, the medicine will help to cure constipation; used wrongly, the same medicine will make it worse.

## THREADWORMS.

Children with threadworms generally suffer from an itchiness at the seat especially at bedtime. This may make them restless and prevent them from going to sleep. The itchiness is caused by the worms coming out of the anus and crawling about. More serious symptoms from threadworms are extremely rare in Queensland. "Picking at the nose" is not a sign of worms.

The only way to be sure that a child has threadworms is to see them in the motions. This is not difficult. They are about the size of cotton thread, about half an inch long, and are probably alive and wriggle. All sorts of things in the

motions, for instance the stringy parts of bananas, are sometimes mistaken by mothers for worms. If you are in doubt, put the things into a small bottle with methylated spirits and show them to your doctor. Children should not be given medicines for worms that they have not got.

**Causes.**

Every threadworm grows from an egg which has been swallowed. These eggs are very small and can be seen only with a microscope. The young child swallows some of these eggs accidentally, perhaps from the fingers of another child. When the worms crawl out to lay their eggs and so cause itchiness, he crushes them with his fingers, which become covered with these invisible eggs. Even though the hands are washed clean, there remain many eggs under the finger nails. All young children put their fingers into their mouths at times, and so they are continually reinfecting themselves, and increasing the number of their worms. Older children who suffer from worms will be found nearly always to have the habit of biting their nails.

**Treatment.**

If the worms are numerous, medical treatment will give relief. Strong medicines are necessary, and as these may be dangerous, they should be given only under medical direction. Injections of strong salt and water (as much salt as the water will dissolve) given after the bowel has been emptied will often bring away many worms, and these injections are harmless. Though many worms may be brought away by medical treatment, there are nearly always a few left behind. From these the child will probably reinfect himself, and in a few months may have as many as before.

The real cure of threadworms depends on the mother. Make the child sleep in good thick "combinations," so that his fingers cannot get at the worms to crush them. Smear some vaseline around the anus before he goes to bed to prevent the worms crawling and causing itching, or ask your doctor for some ointment which will kill the worms when they come out. If reinfection is prevented, the few worms left will die out of themselves.

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## MARKET GARDENING.

### PARSNIPS.

The culture of the parsnip is easy, and is precisely the same as that of the carrot. Depth of soil is of primary importance, and new seed should always be obtained. The seed may be sown in March or April for the main crop, in drills from 2 to 3 ft. apart, the plants being afterwards thinned out to 6 in. They should be ready for use in about six months after sowing.

### PEANUTS.

The peanut prefers a rather light sandy loam which contains enough vegetable matter to make it light and porous to prevent the soil from becoming too dry.

Peanuts, however, can be grown over a fairly wide range of soils, provided they contain a sufficient quantity of lime.

The plant thrives under a great variety of climatic conditions, provided there is a season of at least five months free from frosts; but a greater percentage of oil is contained in the nut when grown under tropical or semi-tropical conditions.

Cultivation of the peanut is a comparatively simple matter. The seed-bed should be well worked to a depth of 5 in. Reduce to a fine tilth by means of harrow and roller in order to obtain a fine mulch.

The object of shallow cultivation will be apparent when it is explained that, after the embryo nuts are fertilised, the stalks to which they are attached will continue to push into the ground until a firm bed is reached for the nuts to mature on.

When the nuts are ripened near the surface of the soil harvesting operations will be facilitated, and the less number of nuts left in the ground.

Sowing may be carried out during spring and early summer. On large areas a corn-planter may be used, either single or double row, suitably-sized plates being chosen for the purpose, but it must be understood that only shelled nuts can be dealt with in this manner; where the shells are only broken, hand-planting must be resorted to.

The selection of suitable seed is most important, the nuts being carefully shelled and hand-picked, only plump and perfect ones with unbroken skins being used for sowing. Neglect in this direction will lead to blanks throughout the crop.

The rows should be 3 ft. apart, with about 15 in. between the nuts.

Cultivation should take place as early as possible, and every endeavour made to keep the ground loose and free from weeds until the flowering period, when all cultivation should cease owing to the likelihood of damage accruing to the plants. When the haulms have quite died down the nuts may be lifted. In America certain implements are used for lifting the nuts more or less successfully, but on friable soils the ordinary mouldboard plough may be used with advantage. Smaller areas are usually dealt with by the ordinary digging-fork.

When lifted, the nuts are allowed to lie in shallow windrows until dry enough to shake off all surplus soil adhering to them. Providing the weather is suitable, they can then be allowed to dry in the open, if some form of protection is given to them from dews; but it will be necessary to prevent their direct contact with the soil by laying down straw or other suitable material. When sufficiently dry they may be carted and stacked in a barn or shed that is protected from weather, and the nuts picked from the stems at the grower's convenience.

Varieties—Virginia Bunch; Red Tennessee; White Spanish.

## PEAS.

This is an important and profitable market garden crop, deserving of more attention than is frequently given. Like broad beans, it is essentially a plant for temperate districts, but is readily grown in the cool months of the year in warmer localities.

The water requirements of the crop are considerable; therefore the preparation of the land should be commenced early enough to bring the soil into good working order, and to conserve the moisture. Both from a market gardener's and farmer's point of view, peas add to the fertility of the land, and may be followed by nearly any crop that he desires to grow.

Any stable, or other well-decayed farm manure may be used in preparing the soil. If the land is in good heart and has been manured for the preceding crop, this will not be necessary, providing a light dressing of phosphates or, if obtainable, potash be used.

In planting, some forms of maize drills can be adapted for sowing peas. For small areas, shallow drills can be opened and the seed dropped by hand, and then covered over by a light harrow, cultivator, or by hand hoe. Do not hesitate to get the horse to work between the rows; it may also be necessary to hand hoe the rows in order to eradicate the weeds that the cultivator does not touch.

The principal market varieties are—Yorkshire Hero, Dairy, Dwarf, Defiance, and Stratagem. As many stocks of so-called Yorkshire Hero peas contain a large proportion of stragglers, mostly a run-out, round, blue pea, it is essential that the grower gives a little care to the selection of his seed, which should be a hand-picked sample, and true to name. Those, who up to the present have only grown Yorkshire Hero are recommended to put in a small area of one or more of the other varieties named, all of which produce much larger pods, consequently they are easier to pick, fetch a better price, and are more uniform in appearance when cooked.

Peas lend themselves well to transport and marketing in bags.

## POTATOES.

Require a deep and friable loam, rich in humus. Such soils are frequently met with along creek or river flats and among the many scrub acres of this State. Where river or creek flats, however, are nutgrass infected, root crops are difficult to cultivate and keep clean.

Under Southern Queensland conditions two crops of potatoes can be grown each year—*i.e.*, spring and autumn—plantings being made in the months of February, and from August to October, according to frost prevalence, although in certain coastal areas plantings can be successfully made of the spring crop during the latter part of July.

In the tropical North, in districts where this crop can be grown, planting takes place immediately after the wet season, the crop developing during the cool months.

The first cultivation for potatoes requires to be deep. Land intended for this crop should receive a thorough preparation several weeks before the planting

season and be allowed to lie and sweeten, during which frequent cultivation should be given to ensure the destruction of weed-growths and to bring about a fine tilth of the soil.

Seed should be selected as free as possible from disease, of uniform medium size, preferably not larger than 2 in. in diameter.

All seed should be well sprouted or shot before planting. This can be effectively carried out by storing in shallow layers in a shed having an even temperature, and covering with straw or other suitable material.

As soon as the tubers show signs of sufficient growth (preferably not longer than one-eighth of an inch) they should be hardened off by exposure to the light, when less damage will accrue during subsequent handlings prior to and during planting.

As potatoes are highly susceptible to fungoid diseases it is advisable that the seed be treated with some form of fungicide prior to planting, and for this purpose commercial formalin forms one of the easiest and most effective methods. Take of commercial formalin 8 oz. and dilute in 15 gallons of water; immerse the tubers for two hours, drain, and when thoroughly dry, rebag, care being taken to see that all bags used have also been steeped in the solution. When dry, the tubers are fit for planting.

Seed, if not too large, may be planted whole and are to be preferred to cut tubers. If it is found necessary to cut the sets, lime (slaked) or ashes must be thoroughly dusted over the cut parts prior to planting.

Potatoes are planted in drills and are usually put in by means of a single-furrow mouldboard plough, the custom being to plant on every third round when taking a 9-in. furrow. This will give sufficient space between the drills for subsequent cultivation. Sets should be planted in the bottom of the furrow and at one side, at least 4 in. below the surface of the soil, with 12 in. to 15 in. between the sets.

As a preventive of blight a spraying of Bordeaux or Burgundy mixture should be given as soon as the leaves show above ground. A second spraying should be given just as the flowers are beginning to form.

Potatoes should not be lifted before the haulms have died down, unless intended for immediate use. Those intended for keeping should be allowed to thoroughly dry before bagging, and afterwards stored in loose, shallow layers in a somewhat dark but well-ventilated shed, care being taken to go over them occasionally in order to reject all bruised or rotten tubers.

Varieties recommended—Satisfaction, Brownell's Beauty, Carmen No. 1, Up to Date, Scottish Triumph.

## PUMPKINS, MARROWS, SQUASHES, AND MELONS.

All members of this family require a rich soil, although pumpkins give fairly good results on comparatively poorer soils than those suited to marrows or melons. The soil should be deeply worked and care taken to add liberal dressings (where required) of manure.

Pumpkins are frequently grown between rows of maize, but where planted by themselves, for cattle use, may be dealt with in drills spaced from 12 to 15 ft. apart and spaced 12 ft. in the rows. The great secret in obtaining success in this crop is to keep the plants moving from the time they show above ground, and frequent cultivation will conserve the moisture, and at the same time check all weed-growths.

Increased returns can be obtained by judicious shortening of the lateral and main vines, which induces the plant to "fruit" and to form thick foliage over the roots, thus enabling it to resist to a greater extent hot and dry conditions.

Marrows and squashes are grown under similar conditions to those of pumpkins, with this exception, the distance between and in the rows being much reduced.

Melons.—Rockmelons like a fairly stiff loam—not the stiffest of soil, but one which responds well to cultivation. The cultivation for rockmelons is similar to that of the cucumber.

Water-melons.—For the production of this crop, on a commercial scale, a warm climate and an assured supply of moisture are essential for market purposes; therefore the crop is practically limited to the coast or to areas which can be watered; however in the inland districts good crops are obtainable when seasons are favourable.

Preserving melons.—From a market gardener's standpoint of profit, these melons are not comparable with watermelons, but a good demand exists for firm-fleshed

preserving melons for jam making. The round-shaped, red-seeded kinds are usually more in favour than the green-seeded varieties.

The cultivation of the melon is similar to that of the pumpkin, but distances between and in the rows may be considerably reduced.

VARIETIES.

Pumpkins, for cattle feed.—Selected Cattle Pumpkins.

Table Pumpkins.—Ironbark, Crown, Triamble, Button, Turk's Cap, Bugle Pumpkins, and Grammas; for general use.

Marrows.—White Bush, White Trailing, and Custard Marrow.

Rockmelons.—Nutmeg, Burpee's Champion Market, and Rocky Ford.

Water-melons.—Cuban Queen, Kleckley Sweets, McIvor Sugar, Sugarstick, Halbert's Honey, and Kolb's Gem.

Seeds may be sown in early spring, as soon as all danger from frost is over.

## KITCHEN GARDEN.

A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in covered seed beds, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

## FLOWER GARDEN.

To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet fox hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

# Orchard Notes for January.

## THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bonemeal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry far beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central District, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quality and even colour, in a case and packing it so that it will carry without bruising, and, when opened up for sale, will show to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find when the returns for the sale of this fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then why spoil the ship for a ha'p'orth of tar after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

(1) That the fruit must be fully developed, but yet quite firm when gathered.
(2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.
(3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.
(4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried

out a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

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# Farm Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstance being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tines set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected

to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

## CONTROL OF WEEDS—SOME USEFUL MEASURES.

Once some species of weeds become firmly established, eradication is practically impossible; effective control of these is only possible before they have become established. Where weeds have taken possession and landowners realise that cutting is impossible, they look with hope to the use of chemicals as a means of destruction; but the question of cost must be considered, and although chemicals have been found to be effective in destroying weeds, on the whole the cost in such cases is prohibitive.

The old method of destroying plants by hand-hoeing or cultivation still remains as practically the only effective one that can be adopted. Provided the weeds are attacked in time and every care is exercised in cutting out new plants as they appear, weeds can be kept in control by this means at a comparatively low cost. Nevertheless, from various causes, weeds may eventually become so firmly established that other methods must be adopted, and the following suggestions are made so that farmers and graziers may adapt them to their needs in accordance with the severity of the infestation and the means at their disposal.

*Destruction by Cultivation.*—Certain weeds that are crop pests have roots or underground stems of such a nature that the plant reproduces freely from them, and, as a consequence, these weeds (amongst them are Johnson grass, sorrel, bindweed, &c.) are difficult to control. The most effective means of controlling weeds of this type is to plough the land deeply about September, and to cultivate it in such a way that the soil moisture is dried out. This can usually be done by cultivating the land very deeply with springtooth or rigid tine cultivators.

The object should be to loosen the land as much as possible, and at the same time to bring the roots to the surface. Provided the weather remains dry, this method is fairly effective, and if the weed is not killed entirely it is thinned out to a considerable extent. Obviously, however, the method is only successful when the weather is fairly dry, and it does not give good results in districts with a heavy rainfall.

*Smothering Crops.*—In conjunction with the cultivation method, smothering crops can be used with excellent results. After cultivating the land thoroughly in the way suggested, a rapid-growing crop such as wheat or oats should be sown. The cultivation of the land puts it in good condition for the crop, and the rapid growth under fairly favourable conditions prevents weed growth and establishes control.

*Enforced Germination.*—Another method of bringing weeds under control by cultivation is to work the land in such a way that the most favourable conditions are created for the germination of seed, and then to destroy the seedlings. Every farmer knows that when crop seed is being sown the soil must be put into a favourable condition for germination, and if the object is to destroy weeds, similar conditions must prevail.

The time and method of cultivating the soil will depend on the habits of the weed. If the weed is one which grows in the spring the soil workings must be made with the object of having the soil in proper condition at that period, while on the other hand if they are winter-growing seeds the soil must be prepared for favourable germination during the autumn.

Generally the practice should be to plough the land at least a month or two before the period when germination is expected, to allow weathering, and then to work with cultivators and harrows to reduce the soil to a fine tilth. In some cases, especially if the soil is in a loose condition, it may be advisable to use a roller in order to make it firm, as germination always occurs more satisfactorily when the seed is in a firm soil with from 1 inch to 2 inches of loose, fine soil on the surface. The young seedlings are then destroyed by the subsequent cultivations given to preserve the mulch and to prepare the seed-bed for the crop.

For weeds such as saffron thistle, star thistle, and others of a similar character which infest the wheat-growing areas, this is the most effective method, but to control these and other weeds which affect the wheat crop it is necessary to adopt a system of long fallow and to have the land under cultivated fallow for about twelve months—A. and P. Notes, New South Wales Department of Agriculture.

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

| | December, 1929. | | January, 1930. | | MOONRISE Dec., 1929. | MOONRISE Jan., 1930. |
|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | a.m. | a.m. |
| 1 | 4.50 | 6.32 | 5.2 | 6.48 | 4.24 | 5 35 |
| 2 | 4.50 | 6 32 | 5 2 | 6.48 | 5.9 | 6.28 |
| 3 | 4.50 | 6.33 | 5 3 | 6 48 | 5.57 | 7.23 |
| 4 | 4.50 | 6.34 | 5.4 | 6 49 | 6.48 | 8.19 |
| 5 | 4 50 | 6 35 | 5 4 | 6.49 | 7.42 | 9.14 |
| 6 | 4.50 | 6.35 | 5.5 | 6 49 | 8.37 | 10.9 |
| 7 | 4.50 | 6.36 | 5.6 | 6.50 | 9.31 | 11 2 |
| 8 | 4.51 | 6.37 | 5.7 | 6.50 | 10.26 | 11.57 |
| | | | | | | p.m. |
| 9 | 4.51 | 6.37 | 5.8 | 6 50 | 11.20 | 12 55 |
| | | | | | p.m. | |
| 10 | 4 52 | 6 38 | 5 9 | 6.50 | 12 16 | 1.56 |
| 11 | 4.52 | 6.38 | 5.10 | 6.50 | 1.11 | 3.2 |
| 12 | 4 53 | 6 39 | 5 11 | 6.50 | 2.9 | 4.11 |
| 13 | 4.53 | 6.39 | 5.12 | 6.50 | 3.10 | 5.19 |
| 14 | 4.54 | 6.40 | 5.13 | 6.50 | 4.17 | 6 27 |
| 15 | 4.54 | 6.40 | 5 14 | 6.50 | 5.27 | 7.29 |
| 16 | 4.55 | 6.41 | 5.15 | 6.49 | 6.36 | 8.22 |
| 17 | 4.55 | 6.41 | 5.15 | 6 49 | 7.46 | 9.5 |
| 18 | 4.55 | 6.42 | 5.16 | 6 49 | 8.50 | 9.41 |
| 19 | 4.56 | 6.43 | 5 17 | 6.48 | 9.47 | 10.14 |
| 20 | 4.56 | 6.44 | 5.18 | 6.48 | 10.39 | 10.46 |
| 21 | 4.56 | 6.44 | 5.19 | 6.48 | 11.9 | 11.18 |
| 22 | 4 57 | 6.45 | 5 20 | 6.47 | 11.43 | 11.50 |
| 23 | 4 57 | 6.45 | 5.21 | 6 47 | ... | ... |
| | | | | | a m. | a.m. |
| 24 | 4.58 | 6.46 | 5.21 | 6.47 | 12.16 | 12.26 |
| 25 | 4.58 | 6.46 | 5.22 | 6.46 | 12.46 | 1.5 |
| 26 | 4.59 | 6.46 | 5 23 | 6.46 | 1.18 | 1.50 |
| 27 | 4 59 | 6.47 | 5.24 | 6 46 | 1.51 | 2.39 |
| 28 | 5.0 | 6.47 | 5.24 | 6.46 | 2.27 | 3.31 |
| 29 | 5.0 | 6.47 | 5 25 | 6.45 | 3.6 | 4.24 |
| 30 | 5.1 | 6.48 | 5.25 | 6.45 | 3.52 | 5.19 |
| 31 | 5.2 | 6.48 | 5.26 | 6.45 | 4.43 | 6.14 |

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

## Phases of the Moon, Occultations, &c.

| | | | |
|---|---|---|---|
| 1 Dec. | ● | New Moon | 2 48 p.m. |
| 9 ,, | ☾ | First Quarter | 7 42 p.m. |
| 16 ,, | ○ | Full Moon | 9 38 p.m. |
| 23 ,, | ☽ | Last Quarter | 12 27 p.m. |
| 31 ,, | ● | New Moon | 9 42 a.m. |

Apogee, 5th December, at 3.24 p.m.
Perigee, 17th December, at 10.6 p.m.

During the evening of the 15th it will be interesting to notice the Moon approaching nearer and nearer to Jupiter until midnight when Jupiter will be only 3 degrees above it, and both being near the meridian, will be rather more than half-way from the zenith, at Brisbane and Warwick, to the northern horizon. The Moon being nearly full, Jupiter will lose a great deal of its brightness, and for two or three evenings its satellites cannot be observed to advantage.

On the 22nd the Sun will reach the Tropic of Capricorn, rising and setting nearly 23½ degrees south of the points due east and due west. It will be found useful to have these points carefully noted on the eastern or western horizon.

On Christmas Day Saturn will be on the farthest side of its orbit, about 886 million miles beyond the Sun, which will then be passing from west to east between the two planets, but very much nearer to the earth. As the Sun sets on that day the magnificent constellation Orion will be rising.

Later on the whole of Orion, with the two finest fixed stars, Sirius and Canopus, stretching round to the right of it, and the Pleiades and Hyades with the great planet Jupiter on the left will, in the absence of the Moon and clouds, present a most beautiful picture of the starry heavens.

| | | | |
|---|---|---|---|
| 8 Jan. | ☾ | First Quarter | 1 11 p.m. |
| 15 ,, | ○ | Full Moon | 8 21 a.m. |
| 22 ,, | ☽ | Last Quarter | 2 7 a.m. |
| 30 ,, | ● | New Moon | 5 7 a.m. |

Apogee, 2nd January, at 1·48 a.m.
Perigee, 15th January, at 10·24 a.m.
Apogee, 29th January, at 2·12 a.m.

On the 3rd the earth will make her nearest approach to the Sun from which its distance will be 91,300,000 miles.

The planets Venus, Mars, and Saturn will be apparently close to one another on the morning of the 3rd; but as they will rise only about one half-hour before the Sun they will be lost in the coming daylight.

On the 6th Mercury will be at its greatest distance, 19 degrees on the east side of the Sun.

The occultation of Tota Geminorum by the Moon, on the 14th instant, which will take place about 11 p.m., will not be visible north of Mackay, where the star will appear very near the northern edge of the Moon. Through binoculars or telescope it will be interesting to watch the star apparently skirting the northern limb of the full Moon. In the southern half of Queensland the star will disappear behind the Moon sooner further south and its reappearance will be proportionately retarded.

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